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ARMY MEDICAL MUSEUM, WASHINGTON, D. C.

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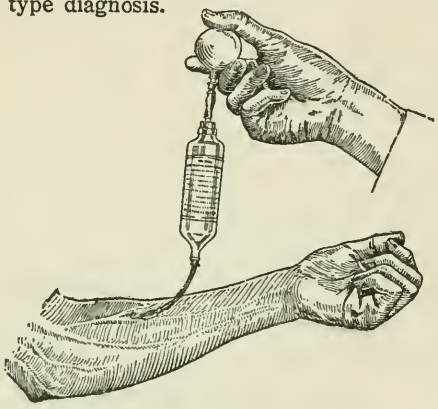

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Contents for November, 1919

Page

Original Articles 495

The Relation of the Civil Practitioner to the Medical Corps of the Army—Presidential Address 495

Short Sketch of the Retiring President, Col. H. P. Birmingham, M. C., U. S. A. 500

Logistics of the Medical Department of the Navy for Distant Operations of the Fleet 502
Capt. Frank E. McCullough, M. C., U. S. N.

The Military Aspect of Base Hospitals 508
Lieut. Col. Gustavus M. Blech, M. C., U. S. A.

Epidermophyton Infection 514
Col. James L. Bevans, M. C., U. S. A.

Diphtheria in The American Expeditionary Force (*concluded*). 521
Maj. Marcus P. Neal and Capt. Alan C. Sutton, M. C., U. S. A.

Modification of the Lyster Bag Treatment of Water for Field Use 538
Maj. Lawrence T. Fairhall, S. C., U. S. A.

Observations and Deductions from the Standpoint of the Urologist in Demobilization Work 545
Capt. Kent V. Kibbie, M. C., U. S. A.

The Management of Hysteria in War 549
Tom A. Williams, M. B., C. M.

Diagnostic Serum for B. Diphtheriae 560
Maj. Edward H. Mason, M. C., U. S. A.

A Census of Susceptibility to Measles and Its Relation to Quarantine Procedures 562
Maj. Andrew Watson Sellards, M. C., U. S. A.

Editorials 566

Honor and Dishonor—Business as Usual.

Association Notes 571

Comment and Criticism 574

Medical Aspect of the American Legion—Important Precautions in Administering Arsphenamine and Neoarsphenamine—Government Wants Workers in Venereal Disease Campaign—A Report on 351 Herniotomy Cases.

Book Reviews 585

The Principles of Nursing (Brown); Ultra-Violet Rays in Modern Dermatology (Bernstein), *Lieut. F. M. Munson, M. C., U. S. N., Ret.*; La Prothese Fonctionelle Des Blesses de Guerre (Ducroquet), *Dr. John E. Summers*: The Hatchet of the United States Ship "George Washington," *Col. James Robb Church, M. C., U. S. A.*: Gunshot Injuries to the Blood-Vessels Founded on Experience Gained in France During the Great War (Makins), *Col. L. A. La Garde, M. C., U. S. A., Ret.*

Instruments and Appliances 588

The Transport Splints of the American Expeditionary Forces .. 588
Lieut. Col. Robert B. Osgood, M. C., U. S. A.

Officers and Committees

Wellcome Prizes

Index to Advertisers

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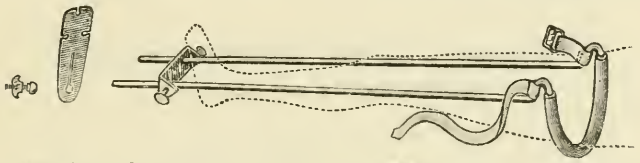

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(To face page 495)

(To face page 495)

THE
MILITARY SURGEON

VOL. XLIV NOVEMBER, 1919 NUMBER 5

ORIGINAL ARTICLES

Authors alone are responsible for the opinions expressed in their contributions

THE RELATION OF THE CIVIL PRACTITIONER TO THE MEDICAL CORPS OF THE ARMY[1]

THE greatest and by far the bloodiest conflict ever waged between man and man in the history of the world ended on the 11th of November, 1918, when the last shot preceding the armistice was fired at the hour of 11 a. m. on that memorable date.

There was much about it that has shocked and grieved the world at large by the unparalleled and wholly unexpected display of utter savagery and an absolute disregard of all our cherished ideas of the humanities on the part of a practically undivided people, from whom the world on account of their other achievements had a right to expect something approaching the ideals of modern civilization and enlightenment. And the sad part of it is that to meet this savage onset the forces arrayed against it were compelled to fight this modern diablery, in part at least, with its own fire.

But out of the wreck and welter of all this one turns with a sigh of relief and a conviction that all is not unhuman and inhumane to the uplifting and consecrated work of the medical man, and among the many testimonials so freely offered, the feeling of his combatant brother, than whom none other knows so well the full scope of his beneficent and devoted work, the exposition of which was so clearly and so feelingly expressed by the Commander-in-Chief of the American Expeditionary Forces in one of his recently published orders, is, perhaps, the most highly appreciated commendation that has been paid him. Moreover, when the history of this war is written, one of its brightest pages and one about which there can be absolutely no dispute will be the one that relates to the preeminent part in this titanic struggle played by the Medical Departments of our Army and Navy. And this brings me to the subject-matter of my discourse.

In the war, we hope now happily concluded, the Army and Navy

[1]Address delivered by Col. H. P. Birmingham, M.C., U. S. A., retiring president, at the twenty-seventh annual meeting at St. Louis, Mo., October, 1919.

of the United States have been indebted to the medical profession of this country as never before in history. When the armistice was declared, no less than 34,987 doctors were serving our Army in uniform, as against a slender peace footing of 447 regular medical officers and about 1,600 reservists, most of whom were inactive before the declaration of war. In the Medical Corps of the Navy, about 3,000 physicians were on active duty, as against a peace personnel of 515. The particular things these men have done in helping to win the war are too well known to you all to need further comment. They are fresh in our minds and hearts as one of the big triumphs of the organized medical profession and will soon be a matter of recorded history.

Glancing for a moment at the history of military medicine in the past, we find the same condition everywhere. In nearly all wars of ancient and recent times, the medical departments of armies have usually been in a state of neglect and unpreparedness from the start, and have had to draw their personnel from the civilian profession. There are only two exceptions, ancient Rome and modern Germany. In the Trojan war, Machaon and Podalirius, the sons of Aesculapius, did surgery on the battlefield, along with other warrior chieftains. The Romans, with a well-organized army, in constant activity, had an organized medical service, small in size, it is true, but well in evidence on the Pillar of Trajan and in the plans of such of their military hospitals as have been excavated. In the Middle Ages, the status of the average surgeon was little better than that of a menial, but in the higher ranks of the profession, some of the greatest surgeons in history, such as Saliceto, John of Arderne, Jerome of Brunswick and Gorsdorff, saw field service and have left their records of it. The outstanding example is, of course, the great name of Ambroise Paré, who came to Paris as a raw barber's apprentice, with no social status whatever, and made his way to the front by going into the army. His surgical writings, especially his early book on gunshot wounds, have the military flavor everywhere. In Paré's time there were a great many such books on gunshot wounds, all written by civilian surgeons who saw army service some time in their lives. William Clowes, the greatest English surgeon of the sixteenth century, was in the British Navy and saw fleet service against the Armada in 1588.

In the seventeenth century we first find the army surgeon in a definite uniform, one of the first signs of real medico-military organization. I need only refer to Richard Wiseman and the many German names of this period. In 1761 John Hunter leaves his dissecting room to sail for Belle Isle, writes his treatise on gunshot wounds and becomes Surgeon General of the British Army (1790). In 1742 Pringle is called

from his chair as "professor of pneumatics and moral philosophy" in Edinburgh to serve with the Earl of Stair on the continent. He takes part in the battle of Dettingen in 1743, where he is instrumental in establishing the earliest phase of a Red Cross Convention, becomes Surgeon General (1742–58) and writes a great book on diseases of the army (1752). Van Swieten in Austria, Richard Brooklesby in England, Morgan, Shippen and Rush in the American Revolution, James Lind in the British Navy, and many French and German names will occur to you. In Germany, Frederick the Great had to send his medical cadets to Paris, the great surgical center of the time, for instruction. The surgeons general of his army all acquired fame in the history of medicine. And so the story goes down to the scramble for civilian personnel in the Crimean War and the enrollment of Weir Mitchell, W. W. Keen, Billings, Hunter McGuire and many others in our own Civil War. Later on, we find that Helmholtz, Laveran, Widal, Cohnheim, Koch, Loeffler, Sir Leonard Rogers, Sir William Osler, Sir Robert Jones, Sir George Makins, Tuffier, in fact the whole medical profession of France and Germany, in the recent war, have done service in the army at some time in their lives; and even un-uniformed civilians, like Virchow, Lord Lister, Da Costa, Stephen Smith, J. J. Chisholm and Raphael Blanchard have turned aside from professional and scientific work to do war-work of greatest value. It is a fact of extraordinary significance to us all that the war service of these men was casual and incidental, yet in each case, we can hardly doubt, rendered in the same cheerful, loyal spirit which has been the common feature of your own service.

May we not draw from these stirring examples some abiding principles for the future? We have, at least, to face this salient fact, that the medical departments of armies in time of peace are usually kept down to a minimum of personnel, and that much of the lost motion which is the inevitable consequence of getting into a war without preparedness is due to this fact. Now the main object of this Association is, and has been, to keep the medical profession of this country in touch with the Medical Departments of our Army and Navy for possible use and service to the country in time of war. After such an experience as we have just gone through, no hard-headed man will again say that wars are unavoidable things, meaning, of course, things people would like to avoid. Have you read Osler's remarks about the transition from the peace-lover, the "proud, mealy-mouthed Victorian," to the actual fighting man, ready to give the enemy a good run for his money?

Dreams and theories do not always work out as per specifications. Wars simply happen as other things in the course of human events—and the main thing is to be prepared for them—in some measure, at least.

We have, at this meeting, an opportunity which may not come to us again. We have a chance to promote unity and concord where it is sadly needed, and not so much for the individual, selfish good of any one of us or any group of us, as for the good of our common country. Shall we follow the lower or the higher motive? Shall we have a divided hour or a compact, serviceable organization of men interested in the military welfare of the country? All of us, each and every one of us, have had our grievances, and our natural safety-valve is to grumble about them occasionally. There is something suspicious about the man who doesn't grumble after it is all over. It is the catharsis of the emotions which the antique philosopher regarded as the sufficient reason for the tragic drama. You know the old army poem about the "Army Growl":

Oh, beware of the cock that never crows,
Of the bird without a song;
Oh, beware of the duck with never a quack—
There is something radically wrong.

Oh, beware of the dog without a bark,
Of the snake without a hiss,
And beware of the soldier without a growl—
Above *all* remember this."

But I take it—indeed evidence enough is piling up in print and otherwise—that most of the men who have come through this war alive are proud of their service. And here I should like to file a brief for the regular medical officer of the Army. He is human like yourselves. Consider him by and large; do not judge of him by the unfavorable specimens. Let me read to you what was written of him some years ago by one of the gentlest, yet wisest and most progressive of our Surgeons General, Robert Maitland O'Reilly:

> But besides his professional work in medicine and surgery, the medical officer of the army has to be master of another subject, of which but little is known to the outside world. This subject is medico-military administration, which deals with complex, difficult, and important problems. It rests upon a professional basis, but it requires a profound knowledge of army regulations, of the life and duty of the soldier, of military and international law, of the relation of the different departments of the army to each other, of the sanitation of large bodies of men in camp and field, of transport of sick and wounded, supplies, establishment, management, and supply of field and base hospitals. It is a specialty and a specialty which requires at least as careful and judicious study as any other. On an exhaustive knowledge of it rest the preservation of the health of the army in the field, the collection of the sick and wounded, their transportation from the field to the base hospitals, with care that through all these steps the minimum of hardship is inflicted and that the operations of the military force are not hampered. It involves an accurate keeping of records, for on this depends the preservation of the rights of the Government as well as those of the soldier. When it is recalled that upon the records of medical

officers have been based the vast disbursements of the Pension Office—more than three thousand millions of dollars—the importance of these reports can be appreciated.

I desire to recall to you the name of one who was a master of this specialty; who, assuming the position of medical director of the great Army of the Potomac, after twelve years' experience in Indian wars, with no information later than could be gained by a study of the Napoleonic campaigns, organized supplies, ambulance corps, division hospitals, and, in fine, brought order out of chaos, with the result that it was the proud boast of the great army that its sick and wounded received immediate attention; that on the battlefield the wounded were succored in an incredibly short space of time, and that no man suffered for want of medical care and nursing. The specialist to whom I refer was the late Surgeon Jonathan Letterman, whose name is honored by us, as are the names of Larrey and Esmarch. Yet, outside of the army, who has heard of Letterman? His own daughter learned a few years ago from Esmarch for the first time of the greatness of his reputation!

And so, gentlemen, we ask all of you to recognize that the trained military medical officer is a specialist in a most important subject, and we ask you to do your share in informing the public that to be a successful and competent medical officer of the army other qualifications must be added to skill in medicine and surgery.

The war has done much for the medical profession of the country, from top to bottom, for in large measure you have all been in it and of it. It has given the big man, perhaps, a broader, larger view of the scope of his work and of the value of the man below; it has been an inspiration and an incentive to hard, earnest work for the younger and less experienced man and has left him better equipped in every way; it has taught the specialist more clearly, perhaps, than ever before the necessity for close relation and coöperation with his fellows; it has, I believe, deeply impressed all who have entered the service with the disciplinary value of good fellowship and team-work as a general essential to success; and it has taught all the importance, aye, the necessity of sanitary surroundings and hygienic living, as well as the ways to meet them, the value of which, particularly to the rural man, will long be in evidence.

But above all—and I am now speaking as a medico-military man only—it has forged a bond of sympathy and understanding between the profession of the country at large and the Regular Corps of the Army, which establishes us as medical confrères, each laboring in his own line in times of peace, but a united, compact, and efficient serving body for the country in time of war.

I therefore ask you to coöperate with us in the problems of the future, in the military welfare of our country in peace and war. As has just been said, the services we have rendered, and of which you have borne by far the larger part, will make one of the most brilliant pages in our history, and when the final account is rendered, you will find that nowhere have these services been more appreciated and better

evaluated than by the Medical Department itself. Let us then continue together, in friendship and concord. Let us hold fast to our old watchword, "In union there is strength."

SHORT SKETCH OF THE RETIRING PRESIDENT, COL. H. P. BIRMINGHAM, M.C., U. S. A.

It is a great heritage to a man, in any calling, that he has been able, by honest effort, to merit the universal esteem of his associates in that calling. The acquisition of place, merely as place, is not the *summum bonum* in life, and the intangible wealth which comes to him who merits and gets the love and approval of his coworkers is the real recompense of good deeds.

No man ever finished his active career in the army with a better place in the hearts of his fellow-soldiers then Gen. Henry P. Birmingham of the Medical Corps. No one "wanted his file" when he retired. Born in New York in 1854, General Birmingham's youth was spent in the city of St. Paul. He was graduated in medicine from the University of Michigan in 1876 and began his army career as an acting assistant (contract) surgeon on November 2, 1878. He went at once into that school of hardihood which the Army maintained in the adjustment of conditions on the frontier, and his first service was performed under Generals Hazen and Ruger in the Sioux Indian country. He was appointed a first lieutenant and assistant surgeon in the Regular Army on February 18, 1881, and continued on duty in Colorado, Utah, Arizona and New Mexico until the latter part of 1885, under Generals Cook and McKenzie. During this service he was complimented in orders for his coöperative spirit and for gallantry in action against hostile Apache Indians.

The outbreak of the Spanish War found him again on duty in the west, whither he had returned after a short time in the east. He was at once assigned to duty with the First Division, First Corps, at Camp Thomas, Chickamauga Park, and went to Porto Rico with that organization in July, 1898. Arriving in Porto Rico he was given the assemblage and organization of U. S. General Hospital No. 1 at Ponce, and so well was this work accomplished under conditions of great adversity that he received the recommendation of his commanding general that he be given a brevet commission.

In 1899 General Birmingham went to duty in the Philippines, filling various positions of responsibility in command of hospitals as chief surgeon of expeditions, etc., until his return to the United States in 1902.

During the next four years he served on important duties on Chief Surgeon of Maneuver Camps, on medical examining boards, and as Chief Surgeon of the Department of Texas.

The years between 1906 and 1909 he spent in Cuba as Chief Sanitary Inspector and Chief Surgeon of the Army of Cuban Pacification. This work in Cuba was signally successful, and after two years spent in Washington as President of the Army Medical Examining Board he was ordered to duty as chief surgeon of the division mobilized at San Antonio, Texas, in 1911. It was in the camp of this division that the world was given the first conclusive demonstration that enteric fever could be entirely eliminated as a disease inevitable to aggregations of soldiers under mobilization.

It was quite consonant with the estimation of General Birmingham held in the War Department that he should have been ordered to Mexico with the Vera Cruz expedition, as chief surgeon with General Funston in 1914. He remained on that duty until November, 1914, when he became Chief Surgeon of the Eastern Department.

In May, 1916, he came to Washington and was acting surgeon general for six months, during the concentration of troops on the Mexican border.

In 1917 he was sent to France on an inspection trip and while there was promoted brigadier general in the National Army. In March, 1918, he was retired from active service as a colonel, being then 64 years old.

No survey of General Birmingham's service can convey with entire exactness the full scope of the estimation placed upon him by his fellow army officers. That could only come in full measure from contact with him. The older the man passing the judgment the more full the meed of praise, just because he knows the better what broad entitlements General Birmingham has really earned.

Whether it be the rough riding cavalryman of the days when saddle pockets were made to carry one's reserve wardrobe, or the young medical officer looking to be taught how to do it by the "Old Man," the heart beat the quicker when he came around, and the glow of affection and friendship became the more effulgent in his presence.

General Birmingham's career epitomizes his character and his aptitudes. His has been the lot of an active man, plying his trade with energy and skill and always to the point when things were to do. How well he did them is so known to those who know him that he must get a great recompense in the consciousness that his fellows think he has deserved well of his country.

Taking his place among the ex-presidents of this Association he joins a group of distinguished men, and he goes into it with the great, good wishes of all who know him, and therefore esteem and love him.

F. A. Winter.

LOGISTICS OF THE MEDICAL DEPARTMENT OF THE NAVY FOR DISTANT OPERATIONS OF THE FLEET

By Captain FRANK E. McCULLOUGH

Medical Corps, United States Navy

NEITHER ancient nor modern naval history records any preparation, extensive or otherwise, for the evacuation of the wounded after a battle, for the engaged ships, except to another fighting ship until after these ships had arrived in port. The evolution of maritime warfare was necessarily slow, and the development of accessory and auxiliary vessels for any purpose was practically coeval with the development of the marine engine. The development of modern surgery was even later, while the practical application of emergency surgery to naval warfare is still in its infancy. Naval engagements on an extensive scale in recent history have been relatively infrequent until the occurrence of the present war. Lastly, the invention of high explosives and large calibered rapid-firing guns, with all the destructive effects upon the human body and the incident high mortality, has stimulated interest in the saving of as many as possible and the bringing to bear of every element to produce this result. In our plans for national preparedness there is nothing deserving of more painstaking consideration than the logistic features of the Naval Medical Department of a sea campaign or a great naval battle. Vessels of war and practically all the components of the train—the supply ship, the repair ship, the collier, etc.—are requisites for peace time as well as during the existence of war. The hospital ship and medical transport are practically the only vessels of the Medical Department entering into the logistics of naval warfare that were part of the peace program. Medical transports must be relied upon to remove the bulk of the wounded from fighting ships to a sanitary base.

Our conceptions of the logistic problems in our naval medical department, like many other features of naval warfare, have undergone considerable modification as the result of naval engagements in the present European war, and also from the lessons learned as the result of "war games" played at the Naval War College and by the Atlantic fleet.

The enemy submarine operations against hospital ships, in violation of international agreement, do not change the situation—they merely complicate it. It may be reasonably assumed that the repeated violation by the enemy of the agreements of the Geneva and Hague Conven-

[1] Read at Annual Meeting of The Association, held in St. Louis, Mo., October 13–15, 1919.

tions have produced a situation which amounts to the non-existence of these agreements, as the outcome of contractual violation. In spite of German "schrecklicheit," it is safe to assume that our attitude toward the enemy will be guarded by the humanitarian spirit of the law of nations rather than the technical interpretation of international law.

It is only necessary to consider the immense coast line of our territory on the Atlantic and Pacific coasts and the remoteness of our insular possessions in the Pacific to begin the realization of the tremendous logistic problems confronting the Medical Department of the Navy. On the Atlantic, the scouting area may include from the coast of Newfoundland to well below the southern end of Florida. The possibility of an enemy seizing an advance base in the West Indies, or equipping one possessed by it, would require a scouting line well advanced to eastward. The necessity of defending the Panama Canal gives a still further scouting area. The Pacific coast, if anything, furnishes a more difficult logistic problem. While it may be safely assumed that our country has no hostile designs against any of its Pacific neighbors operations against this coast must be considered in our problem. It is axiomatic that any nation holding over-sea territory must be prepared to defend it or accept its abandonment to a captor. If such territory be occupied by an enemy, the enemy must be ejected, or an enormous loss of national prestige would ensue, and this, in itself, might be sufficient to invite further aggression. Different viewpoints of policy may arise. A nation may declare its intention to relieve the engorgement of her pent-up lands by the insistence of her right to permit her surplus population to emigrate to other lands not within her jurisdiction. Being met by the assertion that it is a principle of international law that each nation has the right to exclude the people from all other nations from its shores, an invasion of the Pacific coast, either diretly, or via Guam and Honolulu, or both, should be considered as not improbable and the logistic possibilities considered.

Let us examine the text of the "Manual for the Medical Department, United States Navy" for its plan for the transportation of the wounded after a naval battle.

Article 1822 (*a*) reads: "Modern naval warfare presupposes a high casualty rate and a rapid accumulation of wounded, but the casualty rate will vary widely in different ships, probably being highest in the leading divisions. Any effective organization of the Medical Department will usually go beyond the facilities of a single ship and will necessitate the adoption of a more comprehensive scheme of assistance external to the ship, but every vessel should be self-sustaining as far as possible, and no effort should be spared to attain this end."

Article 1832: "When the medical transport or hospital ship is at hand the seriously wounded should be transferred as quickly as is consistent with their welfare. A fighting ship should be cleared of such cases as soon as possible after an action, in order that she may be ready to reengage in battle. On the other hand, patients who will probably soon be fit for duty should be retained on board, and these may constitute a large proportion of all cases."

The plan devised by Medical Director C. F. Stokes, U. S. N., for transporting the wounded after a battle from the engaged ships to the sanitary base is worthy of consideration. It provided for a medical transport (which should be from 10,000 to 20,000 tons) capable of conveying 1,000 wounded, and with a personnel of 75 medical officers and 300 members of the Hospital Corps for each division of four battleships and its auxiliaries. The medical and hospital corps personnel on each transport will be divided into four divisions, one division to be assigned to each battleship and one to the auxilaries. The personnel "would be familiarized with the equipment, drilled in boat work and instructed in the structural peculiarities" of the vessel or vessels to which they would be assigned and also "would be required to make preparation of the spaces assigned on board the medical transport. After action, or during the interval when not engaged, the medical transport units would be placed on their respective battleships with their specially prepared equipment of dressings, etc., and take charge of the wounded for removal to the medical transports. The transports would visit each ship in turn. The flow of wounded would thus be continuous and the fighting ships expeditiously cleared."

The proposed transports were to be liberally provided with boats for conveying the wounded, which are also to be used for saving the shipwrecked. All medical transports are to be available at convenient rendezvous when battle is anticipated and will repair to the scene of the battle at maximum speed when so directed by radio, and "make ready the boats for transportation and rescue. If local conditions permit, the medical units will be rapidly transferred to the fighting ships. Under certain conditions it would be inadvisable to transfer the wounded to the medical transports, but to carry them to the sanitary base in the fighting ships, the medical units remaining with the wounded."

This organization at least presents a logical plan of assignment of definite transports to definite groups of ships, and, as it is necessary to approach any military subject with a definite conception of concrete organization, it has the merit of bringing an otherwise haphazard situation out of chaos. Even if its every detail were found to be impracticable, a complete understanding of the principles it involves would

permit a practiced personnel, provided with adequate equipment, to estimate more intellligently any situation which might arise, and to form a decision leading to effective action.

The majority of writers who have approached this subject have assumed that they are operating always with a victorious fleet. Also the assumption that the transport will keep near the division is not considered tenable. The various tactics which may be employed (for example, those of battle cruisers participating with the main body) will necessitate the disposition of the transports to a position anything but near their divisions. During the progress of a battle, the material injury to a vessel may so reduce its speed as to force its retirement from the position prescribed for it in the battle plan. A whole division may be sunk, and other accident or accidents may cause a wide dispersion of many of the fleet units. A division of battle cruisers may be hundreds of miles distant from one another when one or more battle cruisers may be compelled to engage a superior force. Scouts and destroyers may find themselves, on the sudden clearing of a fog or mist, to be under the fire of a battleship, and, in spite of their superior speed, may be sunk before they can escape. The losses inflicted by the night destroyer attacks give but slight chance for the salvage of lives.

It is not well to be too idealistic in the solution of these problems. Such accidents as the falling out of position of a vessel may easily be coped with after the battle (if we are the victors), and, under certain conditions, a fast transport may be signalled by radio and rescue the crew of a sinking vessel even before the conclusion of a battle.

Though it is neither stimulating nor salutory to consider defeat, it is still very necessary. Our geographic position is widely different from the countries of Europe now engaged in this warfare. Our sea battles may either be fought off our own or the European coast or 1,000 miles distant, which means that our possible logistic problems are much vaster than those of the North Sea engagements.

It is well to consider the possibilities of operating with a defeated fleet. The mission of the medical transports is not changed by defeat; their mission continues to be the evacuation of the wounded from ships that have been in battle, their removal to a sanitary base, and the rescue of the shipwrecked.

Operating with a defeated fleet means an entirely different status for the wounded and those rescued from shipwreck. The enemy commander-in-chief may adopt any of the courses vested in him by the authority of the Hague Convention of October 18, 1907, for the Adoption of the Principles of the Geneva Convention of July 6, 1906, to Maritime Warfare (Article 14), to which the United States was a

signatory power, viz.: The shipwrecked wounded or sick of one of the belligerents who fall into the power of the other belligerent are prisoners of war. The captor must decide, according to circumstances, whether to keep them, send them to a port of his own country, to a neutral port or to an enemy port. In the first case, prisoners, thus repatriated, cannot serve again while the war lasts.

While the personnel is thus affected, the hospital ship or medical transport comes within the provisions of Article 1 of the same convention, which prescribes that they "cannot be captured while hostilities last." A medical transport comes within the same classification as a hospital ship according to the definition of Article 1, to wit: "Military hospital ships, that is to say, ships constructed or designed by states specially and *solely* with a view to assisting the wounded, sick and shipwrecked, the names of which have been communicated to the belligerent powers at the commencement or during the course of hostilities and in any case, before they are employed shall be respected, and cannot be captured while hostilities last." It is to be carefully noted, however that a ship employed for the transportation of the wounded and also for other purposes, as supplies other than medical, would not come within this exempted classification.

Our operations with the allied fleets merely transfer the problem overseas to the European mainland and the British Isles. The Navy considers its equipped establishments ready to care for any naval battle which may occur.

It is not believed that it would be necessary to establish large hospitals at any of our possible advanced bases in the Atlantic. The nearness of the mainland to any such point would seem to render them unnecessary. The hospital ships of the regular establishments could be relied upon to care for the severest cases of injury or sickness more efficiently and probably more economically than such hospitals. The distant Pacific, presenting a very long oversea voyage, renders the reverse course seemingly advisable, and the establishment of advance base hospitals at both Guam and Honolulu appears to be the expedient measure.

The main sanitary bases, both on the Atlantic and Pacific, have been provided for and would be quickly utilized after a battle.

As modern naval strategy demands that the major portion of a fleet remain concentrated for battle, no great difficulty will probably be experienced in conveying the necessary information to the medical transports which will permit them to be at the most favorable situation possible for the performance of their functions after an engagement. Raiding operations may be at such great distances from the hospital ships or medical transports that relief may be long delayed.

Apart from the enemy violation of Hague Convention agreements, the question of furnishing a defensive escort for medical transports and hospital ships must be considered, especially in the case of a battle which is not distinctively decisive, as both transports and hospital ships are subject to capture and the wounded and shipwrecked made prisoners of war.

The speed of our medical transports should be equal to that of the battleships, when possible; the need for keeping up with the main body makes this self-evident.

As Commander E. M. Blackwell, M. C., U. S. N., has pointed out, transferring the wounded from the warship to the medical transport after the battle will be the most difficult problem that confronts us in transporting them to the sanitary base. In smooth water this could easily be effected; but this condition not often prevails in the open sea, as there is generally a swell or waves that interfere and make the process of transference very difficult for the hospital corps and dangerous for the wounded. This will be rendered more difficult from the fact that the cranes and davits on the warships will generally be shot away or otherwise placed out of commission, and it will be necessary to improvise means of lowering patients over the sides into boats or transferring them by trolley direct to the transport. When the sea is only moderately rough, it will be very difficult to transfer patients by means of boats. When practicable and convenient, it would be best for the ships of a division to make for some quiet waters after the medical divisions of the transport arrive aboard and are rendering first aid, etc., en route, and then transfer the wounded to the transport upon arrival there. This would serve the double purpose of giving a quiet place for repairing the damage done to the ships as well as transferring the wounded.

The manifest difficulties attendant upon this operation make it worthy of much experiment and practice as there are many occasions on the broad ocean when the sea will not be sufficiently smooth to permit the transport to go alongside the battleship.

THE MILITARY ASPECT OF BASE HOSPITALS[1]

By Lieut. Colonel GUSTAVUS M. BLECH
Medical Corps, United States Army

IT HAS been recognized long since that if our frontal sanitary formations are to function satisfactorily, they must be organized and maintained on a strictly military basis.

There may be a diversity of opinion about the professional limitations at dressing stations and field hospitals and, to a certain extent at least, also of our evacuation hospitals, but there can be no disagreement on the proposition that these units are part and parcel of the large combatant units which they serve, and that they must adapt themselves to the strategic or rather tactical situations confronted by the divisions, corps, army groups, etc. These conditions necessitate that medical officers serving with divisional and corps sanitary formations must be as conversant with things military as their comrades of the line.

Indeed, there should be little difference between the military training of either class of officers except that each should master his respective specialty. In all general subjects, such as map reading, marching, camping, familiarity with field service regulations and the like, all should possess the same amount of knowledge.

I believe that these views can be looked upon as axiomatic. But when it comes to the medical service of the rear we encounter not only among the civilian profession but among many medical officers as well views which seem entirely out of place in a modern army.

The idea seems to prevail that base hospitals require the members of the staff to be skillful only in their particular professional specialties and that, if they know enough to wear the prescribed uniform, return salutes and sign the monthly pay voucher, they know all there is to be known for them about the military side of their service.

It will be worth while to examine with reference to base hospitals the following hypothesis:

The medical service of the Army is part of the Army the same as the line troops and other technical corps and, like all other services, its sole right to existence in the military family is its contribution to the achievement of a decisive victory over an enemy.

The medical service has been described as the non-combatant branch of the Army, a term, by the way, which is as unjust as it is obsolete, and the question naturally arises in what manner it contributes to battle victories.

The answer is simple. A battle undertaken without the presence

[1] Read at the Annual Meeting of The Association held in St. Louis,, Mo. October 13–15, 1919.

of an organized medical service is doomed in advance. If the medical service were to do no more than morally sustain the men on the firing line through the knowledge that, in the event of casualty, skilled aid awaits them, the service would have its *raison d'être.* But the service does more than that. We must recollect that armies are fixed in number. A nation can furnish a limited number of men for field service, and once that number is exhausted and the issue undecided the nation is practically lost. It is the province of the medical service to reduce casualties from other than battle wounds to a negligible minimum. Selection and public, or, more correctly speaking, military hygiene attain that end. But battle causalties proper, even under the very best strategic leadership, are bound to occur, and upon the medical service lies the responsibility of preventing the firing line from becoming depleted for too prolonged a period. If this be accepted as the proper means of usefulness, it follows that the entire medical service at the front must relieve the combatants from all care of the wounded, must provide such aid as will insure the speediest possible restoration of the greatest possible number of effectives, temporarily placed *hors de combat.* Naturally this will be possible with the so-called slightly wounded, because they still represent a military asset; but the gravely ill, those who are out of the fight forever, and even those who cannot be cured for a prolonged period, cease to be a military asset and naturally are sent to the rear.

Now comes the surgeon serving in base hospitals and says: "You at the front are really soldiers specializing in transportation and first aid to the slightly wounded. You cannot practice surgery at the front, for the wholesale character of your work compels you to be content with a classification of the wounded and the rather pattern-like care of those which require no special scientific treatment. In other words the humanitarian aspect of your calling has to yield to military necessity, but in my place each wounded man is no longer a soldier but an injured individual, and I shall afford him the most scientific care since I have the time, equipment and necessary leisure."

Such a view is partially right and partially wrong, and, if allowed to predominate, will serve to detract from the usefulness of base hospitals

The fact is that the above hypothesis applies to the entire medical service; to all individuals from the Surgeon General of the Army to the soldier packing up requisitions. From the regimental surgeon arresting hemorrhage and applying splints to the specialist in the rear suturing a torn nerve or mobilizing an anchylosed joint, and whether mobile field hospital in shacks or base hospital in a royal palace, all have the same purpose and the same *raison de'être.*

The last war has shown that a modern campaign of importance can be divided into three distinct periods. The first embraces mobilization to the arrival in battle position, the second lasts from the first battle to the institution of peace preliminaries, and the last sees the beginning and end of demobilization.

Up to the last period base hospitals, like all other sanitary formations, have the sacred duty of reducing the hospitalization days of each individual soldier to the minimum. This practice has not been much in evidence in the hospitals I have had occasion to observe in France. I found a tendency to criticize the colleagues of the front, as though they could be blamed for infections, and a policy of holding the patients as long as possible. Ask the individual soldiers and you will hear nothing but praise for their base hospital surgeons. And why not? The wounded who have missed regular meals and beds at the front have these things now and, in addition, the companionship of female compatriots, though it be only for moments in the ward, and they are willing *particeps criminis* in remaining inmates *ad infinitum*.

The front is miles and miles away. The men are detached from their units, dropped from their rolls. They are now carried on the rosters of the hospital, even drawing their pay there, so all is beautiful and serene. All, except that the base hospital unwittingly is harming the Army it is supposed to serve!

The trouble is that in the Manual of the Medical Department of our Army the entire subject of the function of base hospitals is dismissed with a few vague phrases. Straub and that eminent medical strategist, Munson, do not touch it at all, with the result that base hospital personnel have had little to guide them in their military duties before accepting service.

It will be held that there is no need for all this since every competent surgeon is anxious to cure his patients *tuto, cito et jucunde*, but in large institutions the *cito* undergoes varying definitions, depending on a variety of circumstances, but principally due to the lack of insight by responsible surgeons as regards the proper rôle base hospitals play in the Army.

In the first place there is a difference between base hospitals and base hospitals. One institution of this title and designation may be so close to the front as to serve as a natural drain for the evacuation hospitals of the concerned area, while others may be no more than overflow hospitals or, perchance, demobilization hospitals. The surgeons in either must know that they, like their comrades in the frontal formations, have only one mission in the Army, and that mission does not differ one whit from that prescribed for, let us say, field hos-

pital personnel, except with regard to the character of the professional work.

An army is not a permanent organization even under the most ideal conditions, therefore each base hospital surgeon has to determine in each case whether there is to be a likelihood of a complete cure within a reasonable period, whether there is to be a partial cure so that the Government can still utilize the services of the concerned individual, or whether the case is entirely lost to the military service. With this in view there is certainly need of strict organization, of rational classification of the patients and the determination of treatment adapted to the diverse military situations.

It is evident from what has been said that even the professional policy of the various sanitary formations must be governed by military needs. This is fully understood by permanent army officers but, unfortunately, is a subject little appreciated by many who before the war were active in the organization of base hospitals under the Red Cross for future service with the Army. The distinguished medical men who gave up much time and labor in the perfection of their staffs anticipated that they would be free to devote all their time to professional work, and looked upon the prospective appointment of military men as mere adjuncts for the purpose of military administration. This was my experience, and if here and there an exception could be noted, that exception merely proved the rule.

Let us glance at the administrative side of a base hospital. I begin with the commanding officer.

The right kind of a commanding officer will usually be a medical officer who has not only thorough knowledge of things military in general but one who is also thoroughly grounded in medicine and surgery. It is he who is responsible for the discipline of his institution, and that means that all patients are promptly classified upon arrival, properly treated while in the institution, and evacuated forward or rearward, as the case may be, at the earliest practicable moment. Such a commanding officer is not a mere fifth wheel to the wagon nor a mere administrative figurehead to authenticate reports and statistics and to direct the adjutant to read the incoming general orders at the officers' meetings, but is a man who can supervise the activities of the chiefs of the various services in an intelligent manner.

I, for one, am directly opposed to utilizing outsiders for administrative work of medical organizations and institutions. I concede that a quartermaster should be drawn from the Quartermaster Corps. I am satisfied that an infantry detachment should be entrusted with guard duty. I am further willing to have the medical supply problems handled

by a specially qualified officer of the Sanitary Corps, but all other functions should be in the hands of medical officers.

In France the majority of adjutants were sanitary corps officers, and in my own hospital such an officer proved more reliable than a medical officer who held that office for several months, but that one experience has served but to emphasize my opinion that in large hospitals a well-trained medical man must make a real adjutant, whereas a non-medical officer will be no more and no less than a higher sort of clerk. The fact is that the function of an adjutant is to be the intermediary between the commanding officer and the diverse departments, and only a medical man, in accord with the ideas and professional policies of his commander, can be a real adjutant.

Next in importance is the registrar. I have seen some well-educated men acting as registrars who have never seen the inside of a medical school and get away with the job by means of their cleverness and a good medical dictionary, but I have also seen enough of their work to know that it takes a well-educated physician to be a registrar. One example will suffice. A registrar who knew the entire medical dictionary by heart became all excited because a medical officer did not adhere to the manual in reporting a case of acute appendicitis as catarrhal or suppurative. The officer told him: "How in hell can I tell when the fellow refused to be operated on?"

The same luminary permitted the following classification to go through: "Other diseases of the ear." Well, there it was in black and white in the manual, and that sanctified everything, no matter what the authors of the manual may have had in view.

In each hospital with a large contingent of enlisted personnel one or two officers are assigned as detachment commanders. These officers must be not only good disciplinarians but familiar with the drill regulations as well.

One medical officer as a rule is appointed as summary court, but five additional officers will occasionally be called upon to sit as a special court-martial. What I have seen accomplished in the way of illegalities by medical officers about two years after the first mobilization for the world war would seem incredible. I told one otherwise very able and enthusiastic medical officers who acted as judge advocate that he and his court were just too lazy to look up the manual. Had not demobilization stared us in the face, practice in court-martial precedure would have been added to the curriculum of the officers' school which I felt compelled to institute to get anything like military function out of fifty-five medical officers.

Sanitation is another duty requiring military training. To this

must be added the detail of medical officers to survey property, to determine the sanity of officers and men accused of crime or military offenses. But one of the most important military features seldom seen in base hospitals is the military aspect of the ward surgeon. The ward surgeon bears the same relation to the patients in his ward that a captain does to his company. A good ward surgeon has order, system and dicipline in his ward. He knows the needs of his wards, their personnel, and is prepared to report in a few moments whatever information is desired from the headquarters.

At the latter office the system may be ever so good, but it will fail utterly with a negligent ward surgeon in the chain. I have seen the spectacle of a soldier being reported A. W. O. L. when in reality he was transferred to another ward without a report. I have seen patients lie on their beds with dirty shoes on, gambling, spitting on the floor, shouting and what not, while the ward surgeon was busily engaged in the diet kitchen with a purely personal piece of business. I have seen hospitals after the armistice without a post flag, without the usual calls, although there was an abundance of matériel and several trumpeters available. I have seen medical officers walk about the grounds a few paces from where the buglers sounded to the color at the inspiring ceremony of retreat in another hospital—in short I have seen enough to wonder why these medical officers did not ever ask themselves why the Government persisted in giving medical officers rank and emoluments when they apparently thought the uniform a mere external to their continuation of practice with the only difference that whereas formerly the patients were civilians paying them, now they were soldiers and their stay in the hospital paid for by the Government.

I have only one comment to make in conclusion—the next time we will know better!

EPIDERMOPHYTON INFECTION

By Colonel JAMES L. REVANS

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PROBABLY many cases of epidermophyton infection of the skin are unrecognized in the Army as in civil life. A recent case, with a significant history, led to consultation with Dr. Charles J. White of Boston, Edward Wigglesworth Professor of Dermatology in Harvard University. His interesting paper read before the American Dermatological Association at Atlantic City in June, 1919, brought out many new facts and emphasized the importance of the infection.

The case was that of a soldier stationed on the Mexican border during the summer of 1916. At that time he noticed an increasing bromidrosis of the feet, made much worse on one occasion when he was required to stand for a number of hours on a hot asphalt pavement. His condition brought him at this time to sick report. His memory of the state of his feet, besides the bromidrosis, concerns especially his left foot, which was "scalded." He remembers blisters between his toes which, on bursting, left the interdigital spaces red. There were tender calluses on the sole. There was a ring of pustules on the inner aspect of the arch. The ends of the toes were red and tender. Burning and itching were marked. Bathing and powdering bettered the condition, as did the application of various washes. Finally a dilute solution of formaline was prescribed, and this helped so much that the soldier "made it stronger." One application of this "stronger" solution, after burning for a little time, brought complete and immediate relief. Desquamation of the skin ensued, and when it was finished he regarded his recovery as established.

During the summer of 1917 the soldier was stationed in two camps. In the first, which was in the south, he was able to control the returning condition by frequent bathing, changing his socks and the use of powder. The condition disappeared on his transfer to the north, but when the very hot weather of late summer appeared he had another struggle, which only ceased during his trip to France in the fall of 1917.

On arrival in France he was subjected to cold and wet. His snug-fitting shoes were made tighter by heavy socks. In case of exercise his feet perspired; in the absence of it they became cold. Bathing was not often practicable. At night his feet burned. Certain toes became swollen; this added to the lack of interdigital ventilation and increased the soddenness between the toes. There were color changes and changes in sensation. In November he applied for treatment. Ortho-

pedists examined him. The diagnosis was mild trench foot. By this time both of his feet were swollen and sore, but the left was the worse. On this foot the toes were livid, the third and fourth toes being much swollen and purple. There were mottled spots along the ball of the foot and the ends of the toes. Interdigital maceration was noted. The soldier did not give the history of his case. Indeed he did not connect his present symptoms with the past ones, and perhaps there was no connection.

The orthopedic consultants fitted him with good shoes, advised him as to posture, prescribed certain exercises for weak feet, and told him of the value of cleanliness and dry socks and rubbing the feet. He seems to have noted particularly the necessity for dry socks and keeping the interdigital spaces both clean and dry. He followed the directions and came through the winter without having to go to hospitals. There were variations in his condition. In the trenches, where he went later, chilblains appeared, but he escaped the gangrenous spots of the bad cases.

During the spring of 1918 he was almost well, but neglect of his feet for a few days would bring about redness and itching, particularly about the third and fourth toes of the left foot and in the space between them. Once he stood all day in a trench containing thin yellow mud. At night he bathed, but found he could not rid himself of the stain between the toes, and this fact led to the discovery that on the lateral aspect of each toe there was dead skin. So desquamation was continuing at that time.

When the summer of 1918 came to the period of light socks the soldier's feet became nearly normal, but he realized that constant care as to bathing and the changing of footwear was necessary. In July he first noted a spot of typical ringworm, as it occurs on flat surfaces, on the calf of the left leg, just below and to the inside of the popliteal space. This was spasmodically treated with sulphur ointment and has recurred again and again until the present time.

After the armistice he passed a comfortable winter in Germany, with warmth and bathing facilities and plenty of clean clothing. But even here redness around the nails, occasional itching and tenderness and interdigital desquamation continued.

On his return to the United States he arrived during a hot spell. Industrious bathing and changing of socks and the lavish use of powder did not prevent the itching, which was most marked in his left foot. In June, 1919, he noticed a wreath of red spots on the dorsum of his left foot. The third digital interspace was red and glazed. All of the other interspaces of the left foot were sodden. There was a fissure

under the fifth toe. His third and fourth toes were swollen and very tender. He became aware of itching at the gluteal folds, on the scrotum, and in the perineum. Toward the end of June, nearly frantic with the itching, he applied cold cream to his thighs and foot, and this application, while it brought temporary relief to the itching, was followed by a rapid spreading of the affection.

The case came under my observation, with Dr. White as consultant, on July 5, 1919. At that time the process involved all of the toes and interdigital spaces and was extending up the dorsum and sole of the left foot. On the dorsum was a clearly defined, serpiginous border of petechial spots extending from the nail of the great toe, near the interdigital space, to the dorsum of the foot about an inch behind the other toes and ending on the outer side of the little toe. Inside of the border there were the fine scales of desquamation, lines of pink showing through, the area becoming an angry red at the beginning of the interdigital spaces. On the sole of the foot nearly an inch behind the toes was a somewhat swollen ridge ending in a line of small vesicles. The first interspace was dry and desquamating; the second was pink, glazed and clean; the third was red and glazed; the fourth was moist, white and sodden with small vesicles on the little-toe side, anteriorly and posteriorly. The great and little toes had fissures at the flexor folds. The third and fourth toes were swollen and livid, the nails being somewhat embedded.

The raphé of the perineum, from near the anal border and on to the scrotum for a short distance, was dusky brown in the middle line and a livid red along the sides. There were discrete, superficial red areas on the scrotum posteriorly. The thighs for several inches below the gluteal folds were slightly red. On the right side at the gluteal fold there was a slightly raised, bright red crescentic area, without distinct edges, 3 or 4 inches in extent. The right foot appeared normal. On the hands nothing was seen except for one superficial spot of desquamation, such as is often noticed after slight sunburn, near the third right interdigital space. The faint brownish stain of the quiescent ringworm on the left calf could be seen.

Whitfield's ointment was applied to the foot twice a day, beginning July 5. By the night of the 6th all itching had disappeared. There was much less redness and swelling of the toes. A pustule appeared at the serpiginous border on the great toe. The area on the dorsum was much paler. Desquamation was very active and nearly completed between all the toes. By July 9 the foot was quiescent, the only manifestation being desquamation. On August 5 the foot was normal, except that the fourth and fifth toes had slightly heightened color.

The interspaces were white and clean. The area on the dorsum had become pink on one or two occasions. The ointment was applied twice daily until the itching ceased, then daily for a week, and after that every two or three days.

As an experimental treatment, alcohol, containing 2 per cent of salicylic acid, was applied twice a day to the thighs, beginning July 5. Itching was temporarily relieved at once. On July 6 all of the lesions on the thighs were much irritated, and the itching was violent. On July 7 Whitfield's ointment was substituted, and by July 9 the left thigh was nearly normal and only the severe patch on the right side remained. That possessed a clear line of demarcation. On August 1 no signs remained.

The right hand on July 8 manifested very slight evanescent desquamation on the palmar aspect of the hand and fingers. It disappeared in a day. Sago-grain vesiculation was felt on the fingers of both hands on July 10, and there was much itching. Desquamation, without apparent preliminary vesiculation, appeared at the webs of the fingers at about the same time. There was itching of the palms, of the fingers and, anteriorly, of the wrists. There was slight increased redness of the natural lines in the palms of the hands. Whitfield's ointment was begun July 10 with a resulting cessation of itching. Desquamation began where the vesicles had been and spread over the entire surface. Treatment was continued, and on August 5 desquamation was completed. There has been no recurrence.

The development of the infection of the right foot was observed from the first. On July 15 a large vesicle was found in the fourth interspace. It contained clear fluid and, when opened, revealed underneath a slightly reddened surface. The ointment was applied at once, and the interdigital space became normal within a few days. A fissure occurred back of the same toe, but healed rapidly. On July 25 a fissure appeared anteriorly in the first interspace. Rapid healing with desquamation followed application of the ointment in this space.

Another interesting little point in the case is that the patient had a large subungual hyperkeratosis of the right third toe. He says it appeared during the summer of 1916. It has disappeared during the month of treatment.

All signs and symptoms had disappeared in the case recorded by August 15. Whitfield's ointment is Acid salicylic, 2; Acid benzoic, 4; Adipis benzoat, 30. It must be cautiously applied because of its tendency to bring about dermatitis. If this condition ensues, a soothing lotion or ointment may be substituted for a time. No complication was observed in the present case.

In the Journal of the American Medical Association, September 2, 1916, Drs. Oliver O. Ormsby and James Herbert Mitchell, of Chicago, published an excellent article on "Ringworm of Hands and Feet." They describe many cases of what has usually been called dyshidrosis or eczema of the vesicular or vesico, pustular or intertriginous type.

Their review of the literature goes back to 1870, in which year Tilbury Fox first described a trichophyton infection of the soles and palms. He was fortunate in that his first observation was of a typical ringworm on the dorsal surface, and this he followed to its subsequent intertriginous form. Pelligari reported seven cases of involvement of the hands and feet among 150 cases of ringworm of the head. Djelaleddin-Moukhtar, they state, described mycelial threads in 44 cases. Whitfield found 5 cases not distinguishable from vesico-bullous eczema, in 1910, and reported 7 additional cases a year later. Sabourand, in 1910, found the epidermophyton inguinale in 4 out of 6 cases. Kaufmann-Wolff made a mycological study in 1914 of 25 cases which would formerly have been called dyshidrosis. Montgomery and Culver reported a foot case in 1914 which had followed eczema marginatum and in which the epidermophyton inguinale was identified. Hartzell reported 4 cases in 1915, followed in 1916 with 2 cases, one on the plantar surface of the foot and the other of the nails and both aspects of the fingers.

Kaufmann-Wolff's classification is given as follows by Ormsby and Mitchell:

1. *Vesicular:* grouped; marked itching, sago-grains; occurs in hot weather.

2. *Squamous:* resembles scaling dyshidrosis; has central primary lesion; results from confluence of vesicles.

3. *Pyodermic:* secondary infection.

Ormsby and Mitchell give the essential lesion as a vesicle. It is deep seated, of the sago-grain variety, often with clear content. There is no erythema around the new vesicle. A brownish macule follows its bursting. It may remain discrete, desquamate, and produce a slight scaling. It may produce a yellow-brown keratotic button instead of desquamating, thus forming the hyperkeratosis, or it may become bullous. If irritated or infected, the patch becomes eczematoid dermatitis or results in pyodermia. Location changes the character of the manifestation; thus on the hand one sees the exfoliated isolated vesicle and on the heel the hyperkeratosis. The fourth interdigital space is the commonest site because of the ideal conditions for growth. The season of maximum is reached in September, with May as the second highest month.

Dr. Charles J. White recently read before the American Dermatological Association his paper on "A Problem in Dermatological Diagnosis. The Question of Epidermophyton Infection. Based on the Study of 192 Private Cases." He finds that the condition is often not recognized and that its distribution over parts of the body other than the hands and feet is much wider than indicated in the literature.

In 63 of Dr. White's cases, the thighs and adjacent parts were affected; in 33, the feet alone; in 22, the hands and feet; the hands alone were involved in 21 cases, while the thighs and axillae were both infected in 17 persons and the axillae alone in 11; scattered distribution made up the remaining 26. Among these latter were involvements of the bends of the elbows and knees, the flat surfaces of the trunk and extremities, and one case covering the scalp. As to age, his cases were largely in the second to fifth decades, though the very young and the very old did not escape. The cases lasted from a few days up to eighteen years, but the usual duration was from two weeks to four months. More males than females were involved—74 males to 18 females in cases of the thighs and 49 males to 19 females in foot cases, while in cases affecting the hands there were 29 males and 23 females.

As it occurs on the thighs Dr. White's picture of the lesion is that of a "slightly elevated, sharply bounded, distally rounded, red or brown-red or yellow-red, delicately and generally homogeneously scaling area with little if any accentuation of the periphery in untreated cases." It is often bilateral and covers small or great areas. Improperly called "inguinale," instead of the groins, the epidemophyton infects the scrotum, penis, labia, perineum, anus, intergluteal folds, and accidentally only the pubes, abdomen and umbilicus. There are various anomalies as to moisture, redness, white vesico-pustulation, and degrees of infiltration, papulation, lichenification and pigmentation. The perineum becomes rough, thickened and pigmented; the scrotum is very red and glazed and its rugae are obliterated. The penis reacts as it does to irritants and shows redness, slight infiltration, rare scaling and frequent moisture. On the pubes, the disease may readily be mistaken for eczema seborrhoicum and is apt to be multiple. At the anus and anal fold maceration occurs. The area has a dirty white center and an angry, moist periphery. The condition on the labia, dry, thick with slight scaling and much itching, causes confusion as to eczema and pruritus.

Of Dr. White's cases involving the feet, there were 57 of toes and their interspaces, 41 of the sole or arch, and 12 of the dorsum. Deep vesicles were seen in 22; soddenness was present in 15; hyperidrosis in 12; yellow callusses appeared in 4. In cases appearing on and between the toes, exfoliation followed hyperidrosis and left red surfaces. Fissures were

common. In less moist cases lamellated exfoliation occurred, and often there was white soddenness or wrinkling. The lard-like masses between the toes could be detached.

Traveling back on the foot, the lesion was apt to be dry, with a serpiginous border. The dry vesicular type often became pustular. A cribriform appearance was noted after the breaking of the pustules. Thick, yellow callusses, with superficial scaling, represented another form. Sometimes the nails showed pigmented subungual hyperkeratoses and were thick and dull.

Dr. White mentioned as reasons for differences in the condition on the hands and on the feet that the horny layer of the skin of the hands is thinner, it is better aerated and more exposed to substances noxious to the parasite. The vesicles were less deep in his hand cases; maceration was less and eczematization was more marked. Sometimes the natural lines of the palm were multiplied and pigmented.

On the larger flat surfaces of the body the lesions may be eczematiform, psoriasisiform, pityriasiform or lichenoid, but the lichenoid cases appeared only on opposed areas of the upper thigh. The resemblance to seborrhoic eczema was often very marked. If not over stimulated or infected, the disease was apt to remain superficial and dry. Remedies usually successful in the treatment of the simulated conditions were resisted. Dr. White noted that these cases disappear in the winter and recur in the summer. Cases simulating pityriasis were rare.

The mycology of the case reported in this paper could not be studied. The similarity of its appearance, distribution and development to those of other known cases, its prompt subsidence under treatment by Whitfield's ointment, together with the confirmation of the findings by Dr. Charles J. White, make the clinical diagnosis sufficiently definite.

DIPHTHERIA IN THE AMERICAN EXPEDITIONARY FORCE

By Major MARCUS P. NEAL and Captain ALAN C. SUTTON, M.C., U. S. A.

Concluded

Diphtheria in the Savenay Hospital Center

THE SAVENAY Hospital Center, quite similar in every respect such as size, construction, etc., to the two already mentioned, also suffered from a diphtheria outbreak. This epidemic offered the same problems of control. It made its appearance somewhat later, reaching its climax in the second week of December. Thirty-two new cases of diphtheria occurred in the center during December (19 of these were between December 4 and 13). The control measures consisted in culturing and Schick testing all people in a ward following each new case. Twenty-eight carriers were located in December; 4,768 Schick tests were performed, of which 24 per cent were positive, and these men were immunized. Then, as most of the new cases occurred among new arrivals, the system was adopted of Schick testing all cases on admission and all hospital personnel replacements. The result of the Schick test was recorded on each man's service record. All showing positive tests were immunized, and only those with negative. Schicks were allowed to work among diphtheria cases. The epidemic was gotten well in hand and kept under control.

Diphtheria in the Third Army

During the fourth period, dating from the signing of the armistice, the diphtheria problem was practically confined to the Army of Occupation. The combat divisions, once more becoming stationary, were located in areas where contact with civilians permitted a reintroduction of contagious diseases, for there were a number of cases among civilians, especially in Coblentz and the larger towns across the Rhine where the 2d Division was located. Besides, the conditions of hospitalization were such that the presence of an infectious disease such as diphtheria again became distinctly a divisional problem although under army control, for evacuation to the hospital centers in the S. O. S. of such cases ceased, and reports of diagnoses made in the hospitals near at hand were again rapidly referred back to the organization, where such work as the protection of contacts, the location and withdrawal of carriers could be carried out. The official control was in the hands of the epidemiologist and sanitary inspector of the 3d Army. Laboratory work was directed from the 3d Army Laboratory at Coblentz.

Diphtheria became very generally scattered throughout the differ-

ent units. In February there were 110 cases in the 3rd Army (strength 250,614), the highest number for any one month, and at this time was approximately one-third of all the cases of diphtheria in the A. E. F. (strength 1,661,000), although less than one-sixth the strength was represented in the 3d Army. Diphtheria was the most prevalent of all reportable diseases in the 3d Army. The following table and summary (Tables I and II) shows the wide distribution of cases and also a remarkable constancy in the incidence among the various organizations. Fifty per cent show an annual rate per 1,000 between 4.0 and 4.9. The highest is in the 2d Division and Army Troops (both having the rate 7.5). The 2d Division had the greatest number of men and the smallest area. It also had a high incidence of other respiratory diseases. The Army Troops include the personnel of the evacuation hospital where the cases were concentrated. 19.2 per cent of all cases occurring in the Army Troops were in the personnel of this hospital, although it represented only a small fraction of the strength of the Army Troops.

TABLE I.—*Diphtheria in the Third Army (January 1, 1919, to April 29, 1919)*

Organization	Number cases	Mean strength	Annual rate per 1,000
3d Corps	12	10,400	3.5
1st Division	39	24,200	4.9
2d Division	71	29,000	7.5
32d Division	31	24,600	4.1
4th Corps	12	8,700	4.2
3d Division	28	27,700	3.1
4th Division	32	24,300	4.0
42d Division	25	24,500	4.0
7th Corps	8	5,400	5.9
89th Division	29	2,700	4.1
90th Division	19	20,900	2.8
Army Troops	59	24,200	7.5
Total	367[1]	245,600	4.6

TABLE II.—*Incidence of Diphtheria by Companies, Third Army (January 1, 1919, to April 29, 1919)*

Companies having 1 case only	209[2]
Companies having 2 cases only	50
Companies having 3 cases only	10
Companies having 4 cases only	4
Companies having 5 cases only	1
Companies having 6 cases only	0
Companies having 7 cases only	1
Total number of companies involved	275

[1]All are bacteriologically proven cases.
[2]76 per cent of all companies involved.

There were only five deaths, giving a mortality rate of 1.36 per cent. Control measures consisted chiefly in the enforcement of early diagnosis with rapid isolation of cases, suspects and contacts. General sanitation and quarantine were depended upon since the conditions permitted their rigid enforcement. Cultures and Schick tests were not much used because of the widely scattered nature of the cases.

Clinical and Pathological Features

1. *Clinical Features.*—Of the clinical features little can be said, unless one were to repeat the usual text-book descriptions of diphtheria, which are, or should be, well known by all medical men. Anyway, such known descriptions do not belong in the field of a paper such as this. One thing of particular value, however, was learned by most men in the A. E. F., though usually, sad to state, after a regrettable experience. They learned to regard and treat all cases of sore throat, particularly those in which a sign of membrane can be detected, as diphtheria until proved otherwise. During the early days, and especially during the epidemics in the spring of 1918, the medical officers displayed a strong hesitancy to make a clinical diagnosis of diphtheria, or even of diphtheria suspect. Even cases showing a heavy membrane over tonsils, fauces and pharynx, and associated with marked clinical symptoms, were called anything but diphtheria. In some instances it was difficult to get the company and battalion surgeons to send such patients to a hospital There was an inclination to hold such cases as Vincent's Angina, tonsillitis, etc., until proved to be diphtheria. How much of that was due to ignorance of diphtheria and what to the belief that diphtheria was not a factor to be considered in an army is not known, but it is believed that each played a prominent rôle. Many of the officers had the firm conviction that "Diphtheria is a disease of minor importance in the Army," as is stated by Havard in his book, "Military Hygiene," and under the paragraph, "Susceptible Age," of the chapter on diphtheria in Medical War Manual No. 1, Second Edition, Sanitation for Medical Officers, we find this statement: "After this period, the percentage gradually rises until among adults 90 per cent are immune. From this it will be seen that while diphtheria may occur among soldiers it is not apt to become epidemic."

Some cases of wound diphtheria were seen by American and French observers. Cultures from some wounds showing a whitish-like membrane yielded a diphtheria-like organism; these were not in many cases proved to be B. diphtheria, because of the inability to obtain animals for inoculation purposes. In some instances, however, they were proved by animal inoculations to be virulent strains of B. diphtheria. The treatment

of such cases with antitoxin resulted in early improvement. Sufficient experience was not obtained to determine the effect of the local use of antitoxin, or to determine its value as compared to non-immune or non-specific serum. No statistics on the prevalence of wound diphtheria in the A. E. F. are as yet available.

2. *Pathological Features and Autopsy Findings.*—Among bacteriological findings of autopsies done on 4,500 cases of pneumonia the B. diphtheria was recovered in five instances; once from a bronchus, and four times from the consolidated pneumonia areas.

The following table classifies the 13,246 autopsies according to nationality of the deceased, and gives the number of deaths from diphtheria in his groups:

Nationality	*Number of autopsies*	*Number of deaths from diphtheria*
American military (officers and soldiers)	12,825	23
American nurses	30	1
Civilians	43	0
French	54	0
British	15	0
Italian	14	0
Russian	10	0
German prisoners	255	2
Total	13,246	26

Death here recorded are those stated on protocols as due to diphtheria Some deaths in which diphtheria was mentioned as a contributory diseases are not included, because at present the number is not known, and it will necessitate going over each of the 13,246 protocols to obtain this information as no cross-index system has as yet been started by the museum on the protocols.

Of the deaths, twelve occurred during the acute stage of the disease. Of the others, eleven died from later complications or contributory diseases such as pneumonia, broncho-pneumonia, etc. From the available records three of the deaths cannot be stated as being due to diphtheria; in fact they are regarded as probably not due to diphtheria. Of this number, two are stated on protocols to be due to diphtheria merely because a diphtheria-like bacillus was recovered from the throat cultures. (The organisms were not proved to be diphtheria bacilli.) In neither of these two cases was there any record of clinical diphtheria or of a membrane being present at autopsy. In the third case, diphtheria can be said to have beenat the most only a contributory cause. In this instance the case was one of a streptococcic pneumonia. The

streptococcus hemolyticus was recovered from the blood stream. The patient complained of sore throat two days before death and the bacillus diphtheria was obtained from throat culture. The diphtheria in this patient was a terminal disease and was only a contributory cause of death.

Of the deaths occurring during the acute stage of the disease, one case in particular is cited, first because of the use of surgical procedure during the course of acute diphtheria, and secondly on account of the reported recovery of the bacillus diphtheria from the heart's blood at autopsy. It is the case of ———, ———, 849170, Private, 3d Bakery Company. Clinical records of the case are not available; therefore these cannot be given in detail. The brief notes on the protocol, however, state that the patient complained of sore throat and the usual symptoms seen in diphtheria. Throat cultures revealed the presence of B. diphtheria. Examination showed the presence of a membrane on tonsils and in addition some local swelling around one of the tonsils, which was thought to be a peritonsillar abscess. In spite of the clinical picture of diphtheria and the laboratory findings of the B. diphtheria, the supposed peritonsillar abscess was opened by surgical methods. After being well opened, blood escaped but no pus was found. Later during the day, the record states, a tube was inserted in the trachea (does not state whether intubation or tracheotomy). Some hours after the surgical operation for supposed abscess the patient died. The autopsy findings were those seen in the usual acute laryngeal, pharyngeal, and tracheal diphtheria. The bacillus diphtheria was recovered from tonsils, pharynx, trachea, and the heart's blood. These cultures were later proved by animal inoculation. It is believed that the presence of the organism in the blood was due solely to a mechanical invasion and not in any way due to a bacteriaemia. It is believed that while operating in and through a diphtheria field, the organisms were mechanically introduced and washed into the blood stream.

Treatment

In treatment, nothing new was brought out. Favorable results obtained by the early administration of large doses of antitoxin, followed by a second and a third dose after two to five day intervals, even if the patient is in good condition, emphasize the importance and value of this procedure. The unfavorable results obtained in some of the cases can be properly attributed either to delay in administering antitoxin, to an insufficient dose, or in the failure to give a second and third dose. Myocarditis, cardiac paralysis, post diphtheritic paralyses of optic, laryngeal and other nerves, a prolonged convalescence, a certain number

of carriers, and an increased number of days lost by individuals, are the results of this inadequate method of treatment.

Means and Methods of Control

1. *Selection of personnel.*—The most important single factor in the control of any epidemic is in the selection of the officer who is sent out in charge of the field work. He must be a trained bacteriologist, epidemiologist, and sanitarian. He must have sufficient knowledge of the general problems that confront, not only the medical officers of a division or other organization, but also the line officers, so that he may be able to appreciate their viewpoint and weigh it from a military standpoint in relation to his own, should they conflict. Also his own recommendations will be the more practical because of this knowledge. The value of a pleasing personality and a large amount of tact are obvious when one considers how frequently this work requires a junior officer to enter a division or other organization and make changes in methods already in use, which he can demand, if necessary, even in the face of opposition, since he carries the authority of the Chief Surgeon's office with him.

2. *Equipment.*—The equipment that is necessary depends entirely upon the size and nature of the epidemic and the method of procedure that one elects to use in that special case, for to a large extent each out break, even of the same disease, offers special problems which require individual consideration. The choice of equipment, however, is the simplest phase of the work. In general the requirements are adequate incubator space, sufficient media and throat swabs. When possible, an already established laboratory in the vicinity is used such as will be found at a hospital center or a camp hospital that cures for the sick of the troops among whom the outbreak has occurred. With a division, however, it was almost always necessary to reënforce their small portable equipment. For this purpose it is essential to have an automobile laboratory. This is stationed at a central point where it can be equipped with the amount and type of media, etc., required by the epidemic and sent out on short notice all ready to go at once to work.

For diphtheria work it is also essential to carry on hand, at some place that is easily reached, a large amount of both antitoxin and toxin. The former is for both therapeutic and prophylactic uses, while the latter is used in the Schick test for the determination of susceptible individuals. These two articles, which cannot be made on short notice, must consequently be carried at all times in amounts adequate to meet any possible emergency. To attempt to economize by carrying a

small amount of these articles is as criminal as leaving a city without a fire department because it hasn't used one for six months. The ordinary supply officer is not as a rule a good man to trust with the determination of the amount to be carried on hand.

3. *The Use of Throat Cultures.*—The throat culture is about the oldest and most generally used single procedure in the control of diphtheria, and yet even this can stand a little thought. In the search for carriers a certain percentage are always missed in routine culturing. As extensive culturing requires a lot of work and, since the one or two carriers missed by obtaining a negative culture from a positive throat may even nullify all the results that one would otherwise get by withdrawing the carriers found, careful attention to small details in culturing a throat that often make the difference between the culture becoming negative or positive, are essential. The points to be watched are: (1) The Loeffler's Media must be of good quality. The most important single factor is that it must contain plenty of moisture as indicated by the presence of some water of condensation in the tube. This is especially important if a small size 3-inch test-tube is used, as is frequently essential on account of a limited amount of incubator space. (2) The swabbing of the throat must be done with care. A good light is essential. The swabbing must be passed over both tonsils and then across the posterior pharyngeal wall while strong tongue depression is maintained. The pharynx should be swabbed last, as this is likely to gag the patient, filling the throat with mucus, which interferes with further swabbing. If any membranous condition is present, a piece of this should be detached and cultured. Throat swabbing, especially where large numbers have to be done, is very likely to become slipshod as one's attention to small details fatigues rapidly. If this is allowed to occur, the results are likely to be misleading and dangerous. Our work has shown that extensive culturing in the search for carriers is only justifiable when a maximum of care is taken, for otherwise the results obtained do not even equal, let alone counterbalance, the work expended, which could have been devoted to placing more attention on other measures. Besides, it frequently gives one a false sense of security and a sense of protection in feeling that he has done all there is to do. (3) Finally, care must be taken that the inoculated culture tubes are not exposed to direct sunlight, as this is fatal to B. diphtheria.

4. *The Schick test.*—The Schick test is probably the most discussed of all measures used in diphtheria control in the Army unless it is the routine search for carriers in large units. One thing we think stands out clearly as a result of our experience in the A. E. F.—the culturing

of large numbers of men and the withdrawal of the few carriers found by a single examination is useless unless it is at the same time associated with the use of the Schick test on each man followed by the immunization of all who show positive reactions. Furthermore, our results warrant the conclusion that when this combined procedure can be carefully and thoroughly carried out by trained personnel, in organizations of company or even battalion size, while living under anything approaching favorable conditions, the epidemic of diphtheria will be brought to an end in the quickest time possible with our present knowledge. It is understood that such other measures as general sanitary control, the early diagnosis and isolation of all clinically suspicious cases, at least daily throat inspections of the entire group and the careful quarantine of contacts as hereinafter described, will at all times be strictly enforced. When necessary because of a military emergency, a great deal can be done with these latter measures alone, but results will not be obtained as quickly or as surely as when the withdrawal of carriers and the immunization of susceptible individuals are used in addition. In a number of instances in our work, especially in the 32d Division, companies were completely cultured, all carriers found were removed, and yet new cases kept appearing. Then upon reculturing and immunizing those indicated by the Schick test, the continuous appearance of new cases was brought to an end. Likewise the Savenay Hospital Center, after its epidemic of diphtheria, continued to have cases develop among new patients shortly after arrival, although a careful search had been made for likely carriers. The adoption of the procedure of doing a Schick test on all patients at the time of admission, followed with immunizing all susceptibles, brought this trouble to an end. Furthermore, the quarantine of contacts may be considerably shortened by the use of both the throat culture and Schick test. Instead of holding the contacts from ten to twelve days, the maximum incubation time, it is safe to release them twenty-four hours after all susceptibles have been immunized. This shortens the quarantine to three days if the laboratory work is begun at once. This also allows enough time to make two examinations for carriers on successive days, provided the number is not too great or the available help too meagre. This has the value of picking up some who had negative cultures the first day. It is recommended that the contacts giving positive Schick reactions be held twenty-four hours longer after immunization so as to allow for the absorption of the antitoxin and thus assure the protection it accords the susceptible individuals. A case that gave a positive Schick reaction developed diphtheria during the period of the Schick test before antitoxin was administered.

The Schick test showed that, on an average, about 20 to 25 per cent of susceptibles are present in any given group of soldiers. This checks fairly well with most immunity rates, which accord a natural immunity of 50 per cent and an acquired immunity of 25 per cent, upon reaching the 21st year.

Some are opposed to the prophylactic use of 1,000 units of antitoxin on the ground that the artificial immunity which it confers is too transient (ten to twenty days). However, our experience shows that this immunity at least tides the susceptible individual over the period in which he is exposed to diphtheria both at the height of the epidemic and until it is largely controlled. We have a record of only one case developing in an immunized man. He developed the disease twenty days after receiving the antitoxin (1,000 units). At the same time we did have several cases in men living under the same conditions who had not been given the prophylactic dose of antitoxin because of having negative Schicks. It is generally admitted that the use of the Schick test is of great value in selecting the personnel to do the work among diphtheria patients. By limiting this work to only those with negative Schick tests, the chances of the attendants acquiring the disease are greatly diminished. A copy of the instructions from the Central Office for carrying out the Schick test and making the fullest use of it is given below as a basis of information for routine procedure. During the epidemic at the Allerey Hospital Center, where the work of doing the Schick tests was divided up among teams, it was found essential to insist on a uniform technique and interpretation in order to avoid misleading results. The following circular was issued from the Central Office in order to secure uniformity.

SCHICK TEST

The value of the Schick test, when properly performed, as an index to the immunity or susceptibility of an individual to diphtheria has been definitely established. In general, its use in the control of diphtheria has been outlined in Circular No. 60 of this office. Unless carefully performed and correctly interpreted, however, it may be of little value or even misleading.

Its reliability therefore may be said to depend entirely upon the following four factors:

1. The use of a properly diluted and potent diphtheria toxin.
2. The use of a control test with heated toxin.
3. A proper technique with suitable instruments for making the injection.
4. A correct interpretation of the reactions.

1. The *toxin* usually is issued in a standard outfit consisting of a capillary tube containing a definite amount of standardized toxin, a bottle containing 10 c.c. of sterile salt solution and a small rubber bulb for expelling the toxin into the saline (directions given in each packet). The toxin has been so standardized that 0.2 c.c. of the saline dilution equals 1/50 M. L. D., the amount to be given. The diluted toxin must be used within 48 hours, as it soon deteriorates.

2. *The control test* with heated toxin. The capillary tube containing the toxin is immersed in water heated to a temperature of 75 degrees Centigrade for a period of 5 to 10 minutes. With a sterile pipette 3.33 c.c. of the saline solution are withdrawn from the bottle, leaving 6.66 c.c. With this 6.66 c.c. of salt solution the heated toxin is mixed. 0.2 of this dilution is used for each control.

3. Technique of injection. A one c.c. Luer or tuberculin syringe and a 25 gauge needle may be conveniently employed for the injection. The syringes may be obtained by requisition.

The skin over the flexor surface of both arms is cleaned with alcohol and 0.2 c.c. each of the test and control solutions are injected *intradermally*. For the sake of uniformity the right arm will be used for the test and the left arm for the control.

It is absolutely essential that the injection be made intradermally, otherwise the test is of no value. A good guide consists in keeping the oval opening of the needle in an upward direction as it is introduced. It should be visible through the superficial layers of the epidermis when the injection is made. A properly made injection is manifested by a small, elevated, blanched area, or wheal, the size of a split pea, which stands out sharply at the margins from the surrounding skin and shows on the surface the prominent openings in the hair follicles.

4. *Interpretation of the reactions.*—The best results are obtained by making two readings, one at 48 hours and one at 96. Ordinarily the two readings should be made, but at times of great urgency the 48-hour reading will suffice.

(*a*) *The positive reaction* represents the local irritant effect of diphtheria toxin and indicates the absence of the necessary amount of antitoxin in the individual to protect against diphtheria. At the end of 48 hours the site of the injection (right forearm) shows a moderately red area about the size of a five-cent piece. The control is negative. At the end of 96 hours the area of redness is deeper in color, sometimes shows a slightly darker center, and is sharply defined. The control is still negative. During the next few days the test area shows less redness and an increasing brownish pigmentation with superficial scaling. The pigmentation may persist for weeks. Considerable variations in the intensity of the reaction to the diphtheria toxin may occur, indicating varying amounts of antitoxin in the blood of the person tested, but not sufficient to protect against diphtheria.

(*b*) *The pseudo-reaction* indicates a local anaphylactic response to the diphtheria bacillus protein. The protein, unlike the toxin, is not destroyed by heating to 75 degrees Centigrade, and the reaction therefore occurs at the site of both the test and control. At the end of 48 hours there develops, on both arms alike, an area of redness and local infiltration, which usually reaches its greatest intensity in 36 hours and begins to fade at the end of 48 hours. The redness becomes less sharply circumscribed and begins to show a brownish-red pigmentation, and at the end of 96 hours there remains an irregular, poorly defined blotchy area of brownish pigmentation with generally a slightly darker center and in the more intense reactions some superficial scaling. Like the positive reaction the pseudo-reaction may vary considerably in intensity. If the reactions are the same on both arms, the individual may be considered immune.

(*c*) *The negative reaction* indicates that the individual has sufficient antitoxin in his blood to neutralize the toxin and is, therefore, immune to diphtheria. The skin remains normal in appearance both at the site of the test and control.

(*d*) *The combined reaction* evidences an anaphylactic response to the protein and also the lack of sufficient anti-toxin to neutralize the toxin. It is, therefore, the combination of a pseudo-reaction and a positive reaction in the same individual.

He is consequently not immune to diphtheria. At the end of 48 hours there occurs an area of redness and infiltration both at the site of the test and of the control. The reaction at the site of the test may be more active. At the end of 96 hours the pseudo-reaction has begun to fade rapidly and only an irregular blotchy patch with some pigmentation remains at the control area, while at the site of the test the positive reaction now appears distinctly.

5. In recording results, the *positive* and *combined reactions* will be classed together and recorded as *non-immune* and the *negative* and *pseudo-reactions* will be classed together and recorded as *immune*. The results and date of the test will be entered upon the individual's paybook.

6. *Application of the Test.*

(1) *In hospitals:*

a. Selection of immune individuals as attendants to diphtheria cases.

b. When a case develops in a ward all others in the ward should be tested for immunity and those not immune, immunized by the injection of 1000 units of antitoxin.

c. When it is necessary to put diphtheria in wards with other contagious diseases it is desirable to determine the immunity of those not suffering from the disease and immunize all non-immunes.

d. When diphtheria has occurred generally and to any extent all admissions to the hospital should be tested and, if indicated by the situation, the non-immunes either actively or passively immunized.

e. When evacuation is urgent, contacts with diphtheria cases may be evacuated provided their throat cultures are negative and the non-immunes have been determined and immunized.

(2) *In the field:*

a. In determining immunity of intimate contacts with a case of diphtheria, those found to be susceptible may be immunized if indicated by the prevailing conditions.

b. When diphtheria occurs in isolated detachments or groups of individuals who are to be without immediate medical attention, the non-immunes should be determined and immunized.

c. When diphtheria has occurred extensively through a command, and especially if the troops anticipate conditions which preclude the proper enforcement of other measures of control, it may be advisable to test all in the command for immunity and actively or passively immunize the susceptibles. The advisability of such measures, however, must necessarily depend on the existing conditions.

5. *Diphtheria Carriers.*—In general one may say that extensive search for carriers and immunization of susceptibles should be omitted when diphtheria is occurring only in a sporadic, endemic form, but should be used without delay during every epidemic, provi led military conditions permit.

The extensive search for carriers during the endemic ty e of diphtheria is almost useless, for here we have to face the following fact. A certain percentage of the carriers present will not be found. Of those that are found under these conditions, only a certain small percentage will be virulent. Also, in a company of 250 men, you may find a virulent carrier and at the same time miss one. However, it is always well worth while to look for carriers among the intimate contacts with each

sporadic case, and, when involved in an epidemic, search systematically in the entire organization up to and including battalion size, for here these men who are carriers as a result of contact with a fresh case are very largely of a temporary type which clears up rapidly and are also very likely to be virulent. The question of treatment of carriers is a universal stumbling block. Carriers resulting from intimate contact with an acute case are usually very transient and clear up after ten days or two weeks. Antiseptic sprays of many kinds have been tried to clear up the carrier condition, most of which give equally good results in active carriers and, besides, probably have little to do with the disappearance of the bacilli, since about the same percentage clear up untreated. Acriflavine does seem to give somewhat better results than the others. Tonsillectomy seems to be the only thing which will clear up chronic carriers. It is important to wait several months after acute diphtheria before operating, as the tonsil is likely to harbor a virulent streptococcus for some time during convalescence. Cases have resulted fatally from septicemia following too early operation. The investigations at the Mesves Center emphasized the importance of keeping a record of all who were ever known to be carriers of diphtheria. During the epidemic several carriers were found among the nurses and enlisted personnel who previously in the United States had been found to be carriers but were later released upon three negative cultures. If it were known that certain persons had been carriers, they could be placed in positions where a recurrence would not be vital and could be checked up either at regular intervals or at the first evidence of new cases of diphtheria among their companies.

A varied and large amount of individual work was done on carriers in various camp, field and base hospitals, but little was accomplished, and no one thing stands out as being of greater value than many others. In view of such unpromising conditions and in order that the carrier problem in diphtheria and meningitis might be taken up with coordinated action upon a true scientific basis, under proper control, and to insure that the experience and knowledge gained would be utilized on new cases, plans were formulated at the Central Office and approved by the Chief Surgeon, A. E. F., whereby a hospital was to be converted or a new hospital opened to provide for the concentration of these carriers. Such a hospital near Dijon was under consideration and plans for operating it had been prepared when the armistice was signed. A hospital properly constructed, cubicled, ventilated and equipped with the desired apparatus for spraying chambers, etc., would be the ideal place for concentrating all types of carriers, using separate buildings, messes, etc., for men who are carriers of different organisms to avoid cross infection.

It was planned that, as these men were not sick, they would be used on some type of outdoor labor, preferably on a farming project, as a means of keeping them in the open, occupied, and producing such food as could safely be dispensed to neighboring troops, as well as utilized at the hospital. These plans, however, were given up, for it was thought that the military plan for the early return of troops to the United States would probably interrupt this work before it had been sufficiently long in use to warrant any definite conclusions of value and render the additional expenditure of time and money unjustifiable.

6. *The use of general sanitary measures.*—Upon the outbreak of diphtheria in any command the first thing to do is to make sure that all the barriers to its spread are intact. These barriers include the thorough boiling of all mess-kits after each meal; avoidance of overcrowding in barracks, even if this requires the temporary use of shelter tents; the sunning of all blankets twice a week and the prevention of unshielded coughing and sneezing or spitting on floors. We found it wise to concentrate on the enforcement of a few essential things rather than issue a long list of instructions covering all the smaller details. Also it is important to make sure that all recommendations can be carried out before having them issued as orders.

The Procedure Recommended for Handling Diphtheria Outbreaks

The rest of this paper is devoted to a consideration of some of the chief obstacles which were encountered in the control of diphtheria in the A. E. F. and the methods of attack recommended for use under the different conditions likely to be met with in the Army. It is easy enough to work out a thorough plan of control which cares for every detail and say "Do this, and your diphtheria will stop." But, in the Army, especially during a campaign, one must always remember that diphtheria is only one of many problems to be cared for, and the plan for control must always take into account the military plan. Military expediency may require a plan to be changed over night and reduced to the absolute essentials only, throwing aside part of the work in spite of the fact that everyone knows it gives a greater degree of certainty to success. It may be dispensed with, however, if this work is less than the risk subsequent to carrying out the complete plan and thus interfering with the military plan of campaign. Also unavoidable limitations in the number of trained men available for assignment to the control of an epidemic may cause one to follow out a mode of action far short of what he knows is the ideal procedure under the circumstances.

The greatest factor to be taken into account, however, and the one most likely to defeat the successful outcome of one's plans is the natural shortcomings of the men on whom one has to depend for carrying out

many of the details of any plan. Usually it is due to the failure on the part of some medical officer on duty with the troops to be fully awake to his responsibilities or to a lack of appreciation of the importance of the measures he is expected to carry out. This must be anticipated and taken into account in one's work. After a little experience one can quickly tell how much instruction is going to be necessary and what degree of coöperation he can count on as a result of the preliminary sanitary survey which one always makes before outlining his exact method of procedure in a given control problem. Such things as dried expectoration on barrack floors, dust and dirt under bunks, or inadequate facilities for the boiling of mess-kits are an excellent index of the degree to which you can expect your quarantine instructions to be carried out. Or course you know that in case your instructions are neglected you can court-martial someone later. That, however, does not enter into the matter, for failure to control the diphtheria may follow the neglected instructions, which entails the suffering of men, and perhaps even military success has been jeopardized which, like spilled milk, cannot be remedied no matter how well one can explain his failure. The plan determined upon must be carried out; it must anticipate the things which will cause its failure and circumvent them. This requires tact, judgment, and a thorough knowledge of not only the medical problem but, to a considerable degree, the line problem as well.

In the initial survey it is also very important to tactfully find out how the internal administration of the division, or whatever organization it may be, is running; whether there are points of friction, or personal peculiarities, etc., that must be taken into account from the start to insure success. In handling any epidemic one must succeed. Personal pride, etc., must sometimes be sacrificed for the moment. Any such matters can be straightened out later but cannot be tolerated to hold up the work of control. Here is an example of a difficulty in internal administration which was encountered in one epidemic. There was no coördination of the work. The division sanitary inspector and the division laboratory officer each thought the other was useless. It was due to a lack of appreciation of the scope or importance of each other's work due to ignorance and jealousy. This was reflected in some of the difficulties they were having in putting a check to the recurrences of diphtheria, besides resulting in a lot of unnecessary work for both. In other instances, fresh contacts supposed to be held in quarantine were found on duty in kitchens, or even walking unrestricted outside of the village in which they were stationed. Again, the letter quoted below gives another example of the failure on the part of a medical officer to do his full duty.

MEMORANDUM FOR THE DIVISION SURGEON———DIVISION.

1. Report on a case of clinical diphtheria seen at ———— today, patient's name ———, ———, Pvt. 1 Cl., Hq. Company, ——— Infantry, stationed at ————. This soldier stated that he reported sick last night (May 2) at 7 o'clock to the camp infirmary complaining of sore throat, chills and fever. Medical officer was present at this time, but did not examine patient. The sergeant, however, prescribed some powders. Patient again reported at sick call today (May 3) at 8 a. m. and was at this time seen by the medical officer who took throat cultures, gave him three shots of antitoxin in the left arm and placed patient in camp infirmary.

2. At 2.45 p.m. accompanied by Captain ——— of the Sanitary Corps, N. A., I visited this camp infirmary and found the doctor absent. He had left orders with the sergeant, to keep the patient in the infirmary until he returned later in the afternoon unless the patient had fainting or vomiting spells. At the time of our visit to the infirmary, the patient was in such condition that it was deemed advisable to take him to the hospital at once, which I did with my own conveyance. Patient reached the hospital with a pulse of 120 and a whitish-gray membrane covering the pharynx, both tonsils, pillars of the tonsils and uvula. Uvula and pharynx badly congested. Uvula markedly so.

3. It was possible for this patient to have been sent to the hospital by either of two ambulances which went through————previous to the time that we arrived there, one ambulance passing through the town in the forenoon, the other at 1.30 p.m. The driver of the second car inquired from the sergeant at the camp infirmary if any patients were to be sent to the camp hospital, and was given reply that there were none.

4. In view of such conditions, the diphtheria epidemic which is existing at the present will not be easily controlled.

It is easy to see how such things as these may undo all the work one is trying to do. In order to secure the best results one must not be surprised by such things, but rather expect them and, by being on the lookout for them, counteract them before they do harm.

When the first case of diphtheria occurs in a command, the case itself should at once be isolated. The entire company or barracks should undergo daily throat inspection for ten days. All intimate contacts should be quarantined. They can be released if their throat cultures are negative and their Schick test is negative, or 24 hours after receiving 1,000 units of antitoxin if their Schick test is positive. If these controls are not available, the quarantine should cover the maximum ten to twelve day period of incubation. The clothing and bedding of the patient should be disinfected. Should secondary cases develop, the entire exposed command, usually the entire company, should at once be gone over for carriers and immunized on the basis of the Schick test in addition to continuing the rigid enforcement of the general sanitary measures already described. When several cases occur in the same barrack, blankets should be aired daily, sunned when possible, and the entire barrack, bunks, floor, etc., washed down with soap and water.

The early diagnosis and isolation of subsequent cases is the most

important single factor in bringing the epidemic to an end. If many cases of diphtheria are to be sent to a hospital, this hospital should at once determine the susceptible group in its personnel and immunize them. This will also enable them to assign non-susceptibles to the diphtheria wards and almost surely prevent an outbreak of diphtheria in the hospital personnel which might otherwise seriously interrupt the other work of the hospital. These general rules must be modified by common-sense and experience to suit the various conditions met with.

The Control of Diphtheria in Divisions

In attempting to eradicate diphtheria from a division in which it has become fairly well scattered and where small attempts have not checked the disease, we would say as a result of our experience in the A. E. F. that much time can be saved and a much more perfect control maintained after it has once been secured, if a trustworthy nucleus of the group which brought the initial epidemic under control is left permanently with the division and made responsible to the Central Office for maintaining this control. It is fair to assume that this would not have to be done in many divisions, for out of forty-two divisions in France only two or three were ever seriously concerned with diphtheria. It seems highly likely that after diphtheria is once firmly rooted in a division it will continue to flare up from time to time whenever attention is diverted to other problems, or there is temporary overcrowding such as is usually caused by troop movements.

In handling any outbreak of diphtheria in a division, first make a general survey of the situation. This will include not only the number and distribution of cases, and the specific action already taken to prevent the further spread of the disease; but, as already stated, it will include the general sanitary situation and the internal administration of the division. Next study the general military plan of action of the division. Then, based on these findings, carefully work out and put in writing a complete plan of action. If put in writing, subsequent changes or omissions are more likely to be the result of careful thought than hasty action. In the case of troop movements—embarkation, ocean transportation, debarkation, rail transportation, and during active operations—almost entire reliance must be placed on the early recognition and isolation of every suspicious case. All cases found with sore throats or showing membranes, even without clinical symptoms such as chills, fever, nausea, aches, etc., should be considered as due to B. diphtheria until the laboratory renders a diagnosis.

If cases are diphtheria, contacts should be kept in quarantine until sufficient laboratory examinations have been made to detect carriers

or cases which might develop from exposure. If cases are found not to be diphtheria, the quarantine is at once lifted.

This requires daily and, if possible, bi-daily throat examinations. This will not be possible during actual fighting. Here dependence must be placed on the men to report early on sick call. This is a very difficult thing to obtain from men during operations unless carefully impressed in advance of its importance. Two points in general sanitation must be insisted on: First, mess-kits must be washed after each meal in boiling water. Second, steps must be taken to prevent flagrant exposure in barracks, either by separating the bunks with shelter-halves or by the use of masks. The latter, if used, requires careful observation to prevent interchange of masks or reversing the exposed side upon reapplying the mask. In so far as possible, immediate contacts will be isolated from three to seven days as conditions permit.

If the incidence of the disease is sufficient to warrant the delay of the divisional movements, and the military situation permits, then the problem becomes similar to that of a division in a fixed area. Under such conditions the following additional methods of control are advised: The withdrawal of all carriers found; the immunization of those exposed individuals shown by the Schick test to be susceptible to diphtheria; the rigid quarantine, until immunization is completed, of all susceptible contacts. Whether the entire organization is to be cultured and immunized, or whether this is to be confined to the actual contacts under quarantine, is a decision which can only be made in a particular case by the officer entrusted with the control work after weighing carefully the various factors, already discussed, which can affect the situation. In general, however, if diphtheria is epidemic and concentrated in two or three companies or battalions, the entire personnel should be gone over with both throat cultures and Schick tests. If it is more or less endemic, and equally distributed throughout the division, it is better to carefully culture and Schick all the immediate contacts of each case or group of cases. If impossible, for any reason, to both culture and immunize, then omit the culturing. When using the culture method, it is important to be sure that every man whom you have decided to reach in your plan is cultured, for the man missed may be the one who is dangerous.

A MODIFICATION OF THE LYSTER BAG TREATMENT OF WATER FOR FIELD USE

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ONE of the most efficient and easiest methods of purifying water for mobile troops in the field is that of treatment with calcium hypochlorite in a suitable container. Numerous other methods have been proposed, varying considerably in difficulty of application, or in transportability of apparatus, but the use of the Lyster bag with calcium hypochlorite as the sterilizing agent is the official method of the United States Army.

At points in the rear, where more careful attention can be paid to the niceties of water purification, it is possible to sedimentate, treat and filter the water supply, thus affording a water of unquestionable purity and palatability. However, these refinements of purification are not possible in the zone of active operations, and, therefore, a method which is at once the simplest and most efficient is employed.

The container officially recognized in the United States service is the canvas bag devised by Col. William J. L. Lyster of the Medical Corps. This bag consists of specially woven flax sewn to a galvanized iron ring, hinged so that it folds at one diameter. At four equidistant points on the ring, pieces of rope are spliced so that the bag may be suspended on any convenient support. Five nickel, self-closing faucets are placed at equal spaces about the bottom of the bag. The purpose of the bagis not for transporting water, but to provide a stationary receptacle in which water can be held long enough to sterilize and then distribute it. The bag when empty weighs about 7½ pounds and may be folded readily for carriage in the field.

After the bag is suspended and filled with water, the latter is sterilized by the addition of a small quantity of calcium hypochlorite. The latter is contained in small glass tubes in quantities of one gram and is supposed to contain about 30 to 35 per cent of available chlorine. This quantity, added to the 36 gallons of water in the Lyster bag, gives a concentration of available chlorine of about two parts per million and is sufficient to render a highly infected water safe for drinking purposes, provided the chemical is given sufficient time to act on the germs present.

In practice, occasional difficulties are encountered with this method of treating water. In the first place, troops have an inherent distrust of anything that is added to the water they are going to drink in the shape of powder or tablets. All sorts of absurd fiction regarding water thus treated finds ready circulation. This is intensified by the fact

that the water after treatment may have a rank taste due to the hypochlorite present and, after continued use, becomes repulsive. There is often a tendency, as a result of this, to drink the raw, untreated water, followed very often by serious results. Other difficulties that might be mentioned are improper or insufficient chlorination, the inadequate supervision of the process, and wastage in handling the calcium hypochlorite.

Of the various agents that have been proposed from time to time for sterilizing water, calcium hypochlorite still has many advantages. It is one of the more stable hypochlorites, reacts readily with the carbonic acid present in the water yielding hypochlorous acid, and has the advantage of cheapness. However, while calcium hypochlorite is more stable towards changes in temperature and light than most hypochlorites, still it, too, tends slowly to decompose and consequently must be kept carefully stoppered.

The hypochlorite put up in small glass tubes for field use is glass sealed, but even under these conditions it cannot be depended on for constancy in composition, so that its activity must be checked from time to time. A good grade of chlorinated lime will contain 35 per cent of available chlorine. Most samples, however, will show a lower value than this, due to the slow decomposition of the salt. In case the tubes containing it are cracked or have blow-holes, the chlorinated lime may be utterly useless for purposes of disinfection.

For the above reason, the amount of active chlorine available for the disinfection of a water supply is estimated roughly in the field.[1] The method given for this purpose in Medical War Manual No. 6,[2] involves the preparation of a suspension of calcium hypochlorite in 500 c.c. of water and the estimation of the amount of this solution which is stable in a 500-c.c. portion of the water to be treated. Knowing this and the volume of the Lyster bag (36 gallons), the total amount of suspension necessary to chlorinate a bagful of water may be computed. It is recommended for safety, however, that double the calculated quantity be introduced. An excess of chlorine is indicated by the blue color formed on adding ten drops of a solution containing 10 per cent potassium iodide, 1 per cent soluble starch and 0.5 per cent zinc sulphate to a sample of the water.

Although the above method is relatively simple, its actual practice in the field is open to a number of objections. Unless considerable care is exercised in obtaining the small samples of water for the preliminary test, it is conceivable that the samples may not be representative of the water to be treated, that is, they may be more or less

[1] Memorandum No. 7, Div. of Lab. and Inf. Diseases, A. E. F.
[2] Page 338, 1919 Addition.

muddy, or contain scum, all of which would give a false idea of the amount of hypochlorite required. It is very difficult to prepare an even suspension of hypochlorite in the field, because when mixed with water the salt has a tendency to form lumps; hence in testing this suspension a few drops at a time one may very easily form a false estimate of the amount of free chlorine available for disinfection. The use of starch and potassium iodide offers a number of difficulties when small amounts of free chlorine are to be detected. Potassium iodide solution tends to decompose somewhat on standing, yielding free iodine which will give a blue color with starch in the absence of free chlorine. Starch solution, on the other hand, unless freshly prepared, is not very sensitive to free iodine. The color reaction is subject to certain vagaries, fading out sharply under certain conditions and deepening under others. Furthermore, a more stable indicator, ortho-tolidine in hydrochloric acid solution, is more positive and is six times more sensitive than the starch-potassium iodide test, even when the latter is carried out under the most favorable conditions.[3] A further objection to the field method outlined above is the equipment necessary and the necessity of carrying out a computation to determine how much of the hypochlorite to add. The water, furthermore, after treatment with the chlorinated lime, is left with the objectionable taste and odor of free chlorine. In addition, it is somewhat of a disadvantage that the total time consumed in preparing the water for drinking is in no case less than one hour.

In order to avoid the difficulties enumerated above, and especially that of estimating the exact amount of hypochlorite to add, it would be preferable first of all to overdose with calcium hypochlorite so as to insure sterilization, and then to de-chlorinate, so as to remove the rank taste of the hypochlorite.

For this purpose the following method is recommended: The contents of a tube of calcium hypochlorite (1 gram) are added to a Lyster bagful of raw water, stirring the powder in well and allowing the water to stand from ten minutes to half an hour, depending upon the physical condition of the water. A test should be made immediately after adding the hypochlorite to make sure that an excess is present, and it is desirable that a second test be made at the end of the sterilization period. These tests may be made simply by adding half an ampult of a solution of orthotolidine in hydrochloric acid to a small quantity of the treated water—contained in an ordnance cup, for instance. In the presence of free chlorine, a coloration is produced which ranges in shade from a light canary-yellow to a dark red, depending upon the amount of free chlorine present. At the end of the sterilization period, the rank taste and odor of the sterile water may be removed by adding one gram of

[3] Ellms and Hauser, Jour. Ind. and Eng. Chem., 5, 916 (1913).

sodium thiosulphate. The free chlorine is at once acted on by the sodium thiosulphate, and the water is ready for drinking. The small quantity of thiosulphate added is scarcely sufficient to alter the taste of the water; indeed, it is difficult to differentiate by taste between raw water and water that has been thus treated. The amount of sodium thiosulphate remaining after treatment is negligible, since only one gram is originally added to the 36 gallons of water and the greater part of this is used up in the reaction with the free chlorine. In this method, the tube of calcium hypochlorite should be emptied directly into the bagful of water and rapidly stirred in by means of a stick. This stick should be left in the water throughout the whole process of treatment, for, if removed and then later used to stir in the sodium thiosulphate, it may serve to reinfect the water. If the test fails to reveal a definite yellow color after the addition of one tube of calcium hypochlorite, another tube should be added and the water again tested.

As dechlorinating agents other chemical or mechanical means may be chosen in place of sodium thiosulphate. The latter was selected because of its stability and the ease with which dechlorination occurs when the salt is brought into solution. Mechanical means—aeration, filtration through charcoal, etc.,—while efficient, are difficult of application at points where the Lyster bag is a necessity. Sodium thiosulphate has the advantage of cheapness, ready solubility, and is practically instantaneous in its reaction with the hypochlorite, so that the process of water treatment is not lengthened unnecessarily.

A series of experiments was run with this method in order to determine (*a*) the reduction in bacteria that may be expected in a given time, and (*b*) the effect of the chemicals used on the taste of the water. These tests showed that there was but very little taste imparted to the water—certainly the water, which after the addition of calcium hypochlorite had the characteristic offensive odor and taste of chlorine, was entirely freed from the latter after the addition of the sodium thiosulphate.

Laboratory tests made with clear tap water heavily inoculated with cultures of colon bacilli showed a satisfactory reduction in the latter a few minutes after chlorination. In fact, ten minutes after the introduction of hypochlorite and also following the addition of sodium thiosulphate, sterile plates were obtained and no gas developed in the fermentation tests after forty-eight hours. With muddy river water likewise inoculated with cultures of the colon bacillus, a reduction of 90 per cent in the bacterial count and no gas development after forty-eight hours was obtained after the water had stood for thirty minutes in contact with the calcium hypochlorite.

These results indicate that from five to ten minutes is a period of sufficient length to insure satisfactory sterilization of clear water.

Muddy water, however, requires a longer period—a period of at least half an hour to render the water safe for drinking purposes.

Following the laboratory tests, experiments were made at Camp Humphreys, Accotink, Va., for the purpose of simulating field conditions. The samples of water treated varied considerably in physical condition, and water was often selected which was muddy or unpromising in appearance. Water taken from the same source of supply was usually taken at different times, after rainfall, etc., so as to vary the conditions as much as possible. The results of these tests are summarized in Table I.

In the above summary it will be noted that the colon bacilli were destroyed by the chlorination process within a period of thirty minutes in all but three cases. In two of these cases the water was particularly muddy—that from a point in Accotink Creek following a rain and that representing the washings from filter No. 4 at the filtration plant, Accotink, Va. In the third case the water was that taken from a pond and during the chlorination period was found to contain several small minnows, which probably afforded protection for the colon bacilli. For this reason it is advisable to filter the water, even though the action is more or less imperfect, through the top provided for that purpose in dealing with an unusually poor quality of water. All the other tests show a very satisfactory reduction in bacteria count at the end of the half-hour period, and the majority show a satisfactory decrease at the end of the first ten-minute period.

In most cases it was found advisable to add an extra tube of hypochlorite at the beginning of the chlorination, so as to insure a greater excess of hypochlorite than ordinarily used, since with muddy water it was found that the chlorine content decreases from one-half to one and a half parts per million during the half-hour interval—partly due to the oxidation of the organic matter present, and partly due, possibly, to absorption by the clay. Furthermore, it is somewhat difficult to see the yellow coloration produced by less than one part per million of free chlorine in very muddy water.

The materials necessary for treating water according to the method outlined above are: (1) The ordinary tubes of calcium hypochlorite issued with the Lyster bag, (2) 1 c.c. ampules containing a solution of 0.1 per cent ortho-tolidine in a 10 per cent. solution of hydrochloric acid, and (3) tubes containing one gram in each of sodium thiosulphate. The materials are readily put up in this form and are stable. With the chlorinated lime in the brown glass tubes and sodium thiosulphate in clear glass tubes, it is not likely that a mistake would be made very readily, particularly as the instructions call for two distinct tests for chlorine after chlorination.

It must be pointed out in this connection that any such method as

TABLE I—*Field Tests at Camp A. A. Humphreys, Accotink, Va.*

Source of water	Initial dosage free chlorine, P.P.M.	Raw water		10 minutes after dosing		20 minutes after dosing		30 minutes after dosing		Final chlorine content, P.P.M.
		Bacterial count	B. coli 48 hours	Bacterial count	B. coli 48 hours	Bacterial count	B. coli 48 hours	Bacterial count	B. coli 48 hours	
Treated water	1	7,840	+ 0.1 c.c.	10	.....	20	.....	8	.....	0.8
Accotink Creek	2.5	10,380	+ 0.1 c.c.	120	.....	100	.....	160	.....	2.4
Accotink Creek	2.4	2,540	+ 0.1 c.c.	100	.....	80	.....	60	.....	2.4
Accotink Creek	3.0	600	+ 0.1 c.c.	280	+ 10 c.c.	110	+ 10 c.c.	360	+ 10 c.c.	3.0
Accotink Bay	2.0	600	+ 0.1 c.c.	200	.....	60	.....	40	.....	1.0
Washings from filter No. 4	3.0	400	+ 10 c.c.	270	+ 10 c.c.	470	+ 10 c.c.	60	+ 10 c.c.	1.5
Settled water filtering plant	3.0	300	+ 1 c.c.	60	.....	100	.....	40	.....	2.0
Water from a small pond	4.0	800	+ 0.1 c.c.	90	.....	20	.....	60	+ 1 c.c.	3.0
Potomac Bay 12 ft. from shore.	3.2	1,850	+ 10 c.c.	270	+ 1 c.c.	190	+ 10 c.c.	60	.....	3.0
Potomac Bay 12 ft. from shore.	3.0	1,580	+ 10 c.c.	97	.....	30	.....	80	.....	3.0
Potomac Bay 6 ft. from shore.	3.5	150	+ 10 c.c.	4	.....	8	.....	90	.....	2.8
Potomac Bay 6 ft. from shore.	2.2	3,200	+ 1 c.c.	90	+ 10 c.c.	10	.....	15	.....	1.0
Potomac Bay 40 ft. from shore.	3.0	280	+ 1 c.c.	8	.....	20	.....	10	.....	3.0
Potomac Bay 18 ft. from shore.	3.2	640	+ 1 c.c.	80	.....	60	.....	40	.....	2.8
Potomac Bay 18 ft. from shore.	3.0	300	+ 0.1 c.c.	50	.....	120	.....	25	.....	2.8
Potomac Bay 10 ft. from shore.	2.8	480	+ 1 c.c.	160	.....	50	.....	30	.....	2.7
Potomac Bay 40 ft. from shore.	3.0	100	+ 10 c.c.	40	.....	20	.....	50	.....	3.0
Potomac Bay 40 ft. from shore.	3.0	220	+ 10 c.c.	50	.....	30	.....	26	.....	2.7

the foregoing does not aim to produce a pure type of water in the sense of that normally supplied to cities, or even of that possible in the rear. The Lyster bag treatment aims only to convert an unsafe water into a water relatively safe for drinking purposes. It is useful principally in the zone of advance, where transportation is of vital importance and where it can be relied on to help in the ever-constant problem of the health of the army.

It would be preferable, of course, to treat very muddy water with alum and to filter before dosing with hypochlorite, but these refinements call for equipment and delay where time and transportation are of prime importance. Hence it is not reasonable to expect a yield of water highly "purified" in the sense that it is free from any suspended matter and completely sterile. It is sufficient if it is freed from pathogenic organisms. The removal of the excess of sterilizing agent, which gives the water its repulsive taste, is an added refinement, not absolutely necessary perhaps, but bringing some degree of comfort in the continual use of such water.

The main feature of the above procedure is that polluted water may be considerably overdosed with calcium hypochlorite so as to insure effective sterilization, and then made palatable by dechlorination without calling for a great deal of intelligence on the part of the man in charge of the bag.

In operations requiring the use of the Lyster bag, it would be well to organize four water squads for each company, whose duty it would be to control the water supply of the company, and to hold them responsible for the chlorination of the water supply. Each man having carried out the process once, it is difficult to see where there would be any cause for confusion.

A further point might be mentioned—the question of checking up the bags to see whether the water has been treated. Where chlorinated lime alone is used, the sanitary inspector usually tests the bags by adding a little potassium iodide-starch paste to a sample of the water. This test is not applicable to water treated by the method mentioned above. Even though the water has been dechlorinated after treatment, as mentioned, it is still possible, however, for the sanitary inspector to check up on the water by a very simple test. If half a cupful of treated water is added to half a cupful of water drawn from a bag and recently chlorinated, the yellow color obtained with ortho-tolidine is at once discharged on mixing the two, due to the slight excess of sodium thiosulphate left in the treated water.

I take pleasure in this opportunity of expressing my thanks to Col. F. F. Russell and to Lieut. Col. H. J. Nichols for many helpful suggestions and much timely advice.

OBSERVATIONS AND DEDUCTIONS FROM THE STANDPOINT OF THE UROLOGIST IN DEMOBILIZATION WORK

By Captain KENT V. KIBBIE
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THE persistent occurrence of advanced venereal infections among troops examined prior to demobilization, despite their having been inspected at scheduled venereal inspections and despite their having taken the prophylactic treatment within the allotted time after exposure, naturally leads to the conclusion that either more energetic measures should be instituted in the handling and treatment of these diseases or that the present technique is not carried out sufficiently in detail. Theoretically, the present system of venereal service should make for nearly 100 per cent efficiency, yet practically it has proven very discouraging to many of our camp surgeons. A decline from a maximum of 20 per cent of venereal disease incidence in mobilization to a maximum of 1 per cent in demobilization speaks too well for our present system to hastily brush it aside as imperfect in accomplishing its purpose. It is the probable imperfections that have attracted my attention, and pointing them out may stimulate our medical officers toward perfecting measures for their relief.

It has been my province to be attached to a rather active board of medical examiners as urologist, syphilologist and proctologist, and, in this capacity, to observe the venereal pathology as it passed through my service. The aggressive interest and determination of the camp surgeon in attempting to hold venereal disease at its minimum afforded me opportunity to observe, in addition, the general venereal work in the various organizations throughout the camp.

Being appreciative that only by digital examination can an examiner assure himself of the true condition existing around the inguinal rings, the same method was extended to include the genitalia, with the result that venereals running the gauntlet successfully elsewhere found a stumbling block here. With this method, seldom will pathology escape the examiner, nor will this method, in any measure, dispose to complicate the speedy handling of large groups of men. Twenty-four hundred men have been subjected to this method of examination by one examiner during the average working hours.

The men presented themselves, in groups of from four to six, upon a running board that places the pelvis on a line with the eyes of the examiner. With gloved hands the inguinals are palpated, the scrotum and its contents next. Then, with a backward stroke of the right hand,

the shaft of the penis is allowed to fall between the index and middle fingers, while at the same time the fingers of the left hand retract the prepuce. A downward stroke of the right hand milks the urethra and empties the fossa navicularis into the spreading meatus. This is a simple procedure and gives a rapid survey of the inguinals, the scrotum and its contents, the prepuce, meatus and surfaces of glans and corona. Questionable discharges are referred to the microscope, and in a few moments a diagnosis is made.

The number of venereal cases exposed by this method is astonishing yet easily explained when we realize the inherent disposition of men to shield their infections. Aside from its thoroughness it does away with the soldier's camouflage. It has disclosed the practice of using pledgets of cotton and pencils of chewing gum in the urethra with the purpose of presenting a dry urethra. It has also disclosed a lesion deftly hidden under the soldier's thumb or finger, or smothered with dusting powders. Even soot and pan-grease (colored trooper's salve), used to mask a lesion, has failed in its purpose. It has laid bare a common practice on the part of those with contracted preputial orifices to constrict the urethra by their own retractions and to hastily wipe the glans in order to present to the casual eye a clean meatus. I have personally witnessed more than one gonorrheic, while milking his own urethra, made to suffer chagrin when the constricted meatus was relieved by the hands of the examiner. Because the soldier resorts to almost any measure that will afford protection against exposure, too much stress cannot be laid upon the needs of *thorough* inspections. Laxity in this respect leads to chronicity and complications in those infected.

It has been the writer's observation that many inspections are mere formalities. Men are lined up for "short-arm" in ill-lighted quarters and at times inopportune for thorough work. They are directed to expose themselves, and the medical officer hurriedly passes down the line. Only palpable cases are discovered so long as the soldier of average intelligence is allowed to perfect for himself a safe camouflage. Frenal lesions, mucous patches, buboes, and incipient gonorrheas are often passed unobserved. If venereal inspections were conducted with the same degree of thoroughness as the general inspections by line officers, our results would be more definite. Few soldiers are unappreciative of the exactitude of line inspections and, consequently, make little effort at deception, while medical inspections of the "flying type" are frowned upon as mere formalities—a game to beat if you can. Ridding these inspections of temptations to deceive and to camouflage by thorough and exhaustive methods will go far toward curtailing its presence among our troops.

In addition to thoroughness in inspections, I wish to enter a plea for greater consideration of the importance of diagnosis and treatment of venereal diseases in the service. Especially does this apply to work outside of base hospitals. There is a woful disposition on the part of medical officers to overlook the presence of venereal diseases and their various manifestations either through indifference or inability to recognize pathology. Even a tentative diagnosis in many cases is lacking. The following illustrations will suffice for what I have in mind.

Private ———, up for discharge with a large syphiloderm, ulcerative type covering the entire buttocks. Statement: that this had developed in France as a result of the rubbing of his pack; that he had received both hospital and infirmary treatment consisting of ointments and lotions, but received no relief. He claimed that he was compelled to sleep on his stomach on account of this condition. When informed that it was syphilis he bitterly resented the statement. Being held for fourteen days treatment, the lesion had entirely healed.

Corporal ———, up for discharge. Presented an inflamed meatus with 1-inch induration, from which exuded a mild sero-sanguinous discharge. Statement: that this thing had bothered him for two months and that he had been treated for gonorrhea and advised that the reason it did not get entirely well was because of stricture. Held under the diagnosis of urethral chancre and under appropriate treatment was promptly relieved.

Seageant ———, up for discharge. Had two scrotal ulcerative lesions. Statement: that he was chafed and local treatment had failed to relieve him. Held as an ulcerative syphiloderm and was soon relieved.

Lieutenant ———, up for discharge. My attention was directed to his "foggy" voice. A squamous patch was readily observed along the front border of the sterno-cleido-mastoid. Statement: that he had severe laryngeal and pharyngeal disturbance during the last six months of service, and that the medical treatment administered left him with the impression that he was suffering with tubercular laryngitis. General adenopathy, skin manifestations, and Wassermann pointed unerringly to the true malady. After his first treatments, he stated that at last he could eat without pain.

Cases, similar to those outlined above, might be multiplied many times, but these present enough to emphasize the need of constantly bearing in mind the various manifestations of venereal disease during the inspection of troops. Among the more common errors is the failure to consider the presence of a mixed infection in suppurating inguinal buboes that show a disposition to become indolent and that do not yield to the ordinary medical and surgical measures. By far the larger majority of men give a history and show evidences of treatment. In some instances regimental surgeons have followed their men through the examining board, offering the explanation that such-and-such a condition was considered innocent. If there is any line of disease the army medical officer should take pride in knowing and diagnosing, it is that of venereal origin.

In civil life, the practitioner may excuse himself upon the ground of lack of familiarity or of dislike for this type of practice, but it is hoped that the excellent opportunities afforded by the service for this study will instil a disposition for keener appreciation of the study and care of venereal diseases in civil life. This laxity is displayed in the repeated attempts of the civilian practitioner to treat enlisted men for these maladies. Circumcision in the presence of open lesions, cauterization without first definitely determing the true pathology, administration of arsenicals sans pathology, sans conscience, all bear witness of that type of civilian practitioner who labors only with the hope of disposing of an open lesion or milking a soldier out of a fee. Not only should the soldier be held accountable for his attempts to secure such service, but the practitioner as well should be made to answer for the kind of medical or surgical aid given.

Our Federal Health Bureau has done much toward enlightening the public regarding venereal diseases and their consequences, and it falls to the medical profession, in and out of the service, to support these efforts by more than a passing interest. That can best be done by a thorough knowledge and appreciation of venereal pathology and its manifold manifestations and also by adhering to the most approved methods of handling venereal diseases as mapped out in the Venereal Service of the United States Army.

THE MANAGEMENT OF HYSTERIA IN WAR

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(With six illustrations).

FUNCTIONAL nervous disease is responsible for at least 10 per cent of the evacuations of soldiers during an attack. The vast majority of these men are found to have hysteria, and the greater proportion of them, if properly managed at once, can be returned to the firing line in a state of greater efficiency than before their sickness.

Those who do not have hysteria are for the most part in a state of high emotivity, termed anxiety neurosis on the records of the A. E. F. However, the majority of anxiety cases do not arise during battle. That condition is usually of slow onset and occurs after long-continued duty, as has been shown in the French army.

A small proportion of the men evacuated during battle will be found to have cerebral commotion, true shell-shock. This is characterized by: (1) The history of long-continued coma followed by torpidity and inertia. (2) A period of obnubilation and confusion often accompanied by hallucinations, delusions and erratic behavior. (3) Modification of the reflexes; the cutaneous reflexes may be absent and the plantar reflex in extension; the tendon reflexes may be exaggerated, diminished or a symmetrical at different periods; the pupils are usually widely dilated, although they react except during the initial coma. (4) Vasomotor disturbances, pallor, cyanosis, hypotension with asymmetry in different limbs. (5) Alterations in the cerebrospinal fluid, characterized by a disproportionate abundance of serum-globulin and albumen, with a relatively small increase of cellular elements unless hemorrhage has also occurred; in hypertension of the fluid, usually quite marked in the earlier stages, nearly always over 40 mm. and often over 100. (6) Labyrinthine disturbances revealed by reaction to galvanism, rotation and douching tests. (7) Distinct amnesia is usually present, even after the confused state ceases. It is, however, an error to believe that the recollections which disappear are the more recent. In many cases the memories lost are those of childhood, while those of the war persist. The law of Ribot does not hold.

The symptoms of these patients are not removable by psychotherapy; but it must not be forgotten that the suggestibility of a man in this state is highly increased and many hysterical symptoms do show

themselves in commotioned patients. The removal of these by psychotherapy is no proof that a man has not been commotioned. Thus in one case after forty-eight hours of coma there was contracture of the lower limbs and complete mutism, although the former was made to disappear in a few minutes by suggestion, and the patient walked. Now, although the mutism disappeared during a dream in the night, although a contracture of the upper limbs ensued after lumbar puncture, although a hysterical chorea developed a month later, and although this man was able to return to the front soon after, yet a diagnosis of hysteria, though manifest, was insufficient, for rachiocentesis proved that there had been a cerebral commotion, for the fluid was distinctly hemorrhagic.

Trauma, or diseases which interfere with the activity of the cerebrum, decidedly increase suggestibility. Again a stay in a hospital furnishes suggestions towards hysterical accidents. Hence, neither the presence nor the rapid cure of a hysterical accident excludes a diagnosis of commotion.

HYPER-EMOTIVE STATES WITH ANXIETY

Emotional patients are often mistakenly labeled hysterical. Their condition is really quite different. Such individuals are far from suggestible.[1] It is difficult to obtain access to them, so absorbed are they in struggling against their anxiety. They often show tachycardia, vasomotor disturbances, excessive sweating, nearly always insomnia often with nightmares, their appetite is poor or they bolt their food, they are disinclined to smoke or do so feverishly and rapidly, and they are restless. These symptoms are aggravated by bombardment, by contrarieties. The patient rarely shows any focal symptoms such as paralysis, contracture, mutism, deafness, vomiting. True convulsive attacks do not even occur in these patients, although an emotional crisis might be mistaken for one by a careless observer. These patients are not amenable to suggestion, although they are amenable to a rational psychotherapy which penetrates the mechanism of their disturbance.

HYSTERIA IN THE WOUNDED

When there is a wound, and more especially one which has implicated a nerve, the attention of the clinician may be derailed from a psychogenetic interpretation of a case of war hysteria. This condition is very common, although it has been so frequently overlooked as to lead

[1] For the criteria of hysteria one should consult the various communications of Babinski since 1906, the discussion at the Paris neurological Society 1907–08 and my own publications on the subject since 1908. See index in Surgeon General's library. The differentia from emotivity are there clearly pointed out, as well as the principles of diagnosis from disturbances which are physical, neurotic, organic In my own writings the management of cases is presented also, see 1912 J. A. M. A.

to the assertion that hysteria does not occur in the wounded. On the contrary, there have been thousands of wounded men in whom a hysterical syndrome has grafted itself upon the wounded part and has become so fixed as to require an intensive psychotherapy for its removal. The following examples and photographs illustrate this fact:

Case 1.—A soldier received a wound in the upper arm which had severed the musculo-spiral nerve. Suture was done. After the wound healed the man was sent back to his farm for a year with instructions to work. This he did, returning for inspection with a dropped wrist and unable to extend the fingers. Examination showed that all the extensor muscles responded both to faradism and to tapping. However, no voluntary movement whatever could be accomplished by the patient, so much so that the chief of the service believed that stretching of ligaments and tendons accounted in large part for the man's incapacity. I saw no evidence of this and immediatey began to reëducate the movement by persuasion, with the result that in less than five minutes complete extension of both wrist and fingers could be accomplished by the patient, who was not backward in showing his joy at his rapid recovery. The mechanism in this case was very simple; its foundation was the man's belief that, because the nerve which raised the hand and fingers had been cut, he thought it was impossible to make these movements. Accordingly he had never really tried. With regard to these movements he had therefore not exercised the dynamic volition which the psychotherapy compelled him to do.

Case 2.—In this case the mechanism was one of pure suggestion, as the wound which existed did not directly affect the extensors, for it was in the flexor region, as the accomoanying photograph clearly shows. (See Figs. 1 and 2.)

Case 3.—Still farther removed from the first mechanism is the next case, where the wound was in the metacarpus. It is possible that reflex inhibitions had been responsible in the first place for part of this patient's inability, but the complete immobility was psycho-genetic. (See Figs. 3 and 4.)

Case 4.—Similarly it is very doubtful that anything but a psychogenetic mechanism was responsible for the disability of the arm in this man, where there existed only a flesh wound of the shoulder. (See Figs. 5 and 6.)

These cases may instructively be compared with one of those reported in my paper on modern treatment of hysteria to the American Medical Association in 1912, where in spite of an atrophy of the hand produced by a hematomyelia,causing a great diminution of power, the patient was enabled to use the hand sufficiently to work as a mechanic after one period of reëducative persuasion.

The leading *differentia* are that in a nerve wound there is a disappearance or, at least, great diminution of reflexes. There is localized muscular hypotonia and atrophy, as against slight general diminution of volume of the limb, which may sometimes occur from disuse during a hysterical paralysis. The modification of the electrical reactions is always present when a motor nerve is wounded, although these are not noticeable until ten days after the accident. The localization of the symptoms to the territory of the peripheral nerve wounded, of course,

cannot be reproduced by suggestion. If the symptoms extend beyond this territory—a frequent occurrence—the additional symptoms, not having the above-mentioned characters can be made to disappear by persuasion.

Reflex Paralysis.—However, a diminution of power in the movements of a limb may result exceptionally as a consequence of a wound which does not involve the nerves supplying the muscles concerned, and without the participation of a psychogenetic mechanism. This is believed to be in consequence of afferent impulses from a wound of another nerve or even of the connective tissues, in which afferent impulses determine reflexly an inhibition or excitation, more particularly of the vasomotor system. This usually leads to an inadequate blood supply of the muscles and poor nutrition, accompanied by chilling, which sign leads us to suspect this condition. Other symptoms are: alteration of tonus, alteration of reflectivity, especially hyper-reflectivity of reflexes and of muscles themselves to tapping, a slowing of the muscular contractions on electrical stimulation with anticipation of the tetanic curve, localized muscular atrophy not accompanied by reaction of degeneration, tremor on attempted use, diminution of the capillo-arteriole blood pressure, diminution of the oscillations of the arterial wall, cyanosis, osteoporosis, hyper-esthesia of the muscles and nerve trunks.[2]

The disturbances really present are usually enormously exaggerated by the suggestion brought by their presence. It is almost the rule to find the limb completely immobile and to be able to restore most of the movements by intensive psychotherapy. In some cases the morbid physical reactions gradually cease, but in others a tendency to rapid chilling of the limb and a diminution of dexterity has persisted for years.

PSEUDOPATHIAS

Hysterical Algia.—Still more difficult to correctly diagnose, and above all to treat, are those cases of trauma without external wound or visible bruise, but where the question is one of sprain of ligament or tendon. Even after the initial damage is healed the patient may continue to hold the part in an awkward attitude and complain of pain when any movement is attempted.

The same condition obtains even when there has been no trauma, but in cases which have originated from a local neuritis, myositis, or aponeurotic fibrositis, anthritis, teno-synovitis, resulting from chill, toxicosis, or perhaps from the assumption of a faulty attitude. Not only does the faulty position interfere with the function of the limb affected, but it disturbs the whole locomotory balance, as well as the

[2]See the book of Babinski & Froment, also a forthcoming article in American Archives of Neurology

patient's mental attitude toward his functions. We know that as soon as a normal attitude is given to the part, the pain soon disappears. The problem then is to so influence the patient as to compel him to perform movements which restore the limb segments to their proper relation. This has to be done by the devices of psycho-therapeutic art. It is not necessary to conceal this in complicated mechanical apparatus, as more direct methods have proved the best. It is all dependent upon the skill of the therapeutist.[3]

An algia is merely a phobia against pain. The degree of the pain does not affect the question; what is important is the patient's mental attitude, for functions may be performed in spite of most intense pain, and where pain should be quite negligible it may lead to complete incapacity. The commonest of the algias during the war has been hysterical sciatica, but pseudo-lumbalgia and pseudo-gastralgia have also been common.

False Gastropathy.—But the suggestion which arouses the psychological symptoms may be derived not from injury, but from disease. Such cases have been quite common during the war. The most frequent, perhaps, are those where the digestion is concerned. The foundation has been a real break-down of the dealing with the food in consequence of fatigue, irregular and hurried eating, and the taking of excessive quantities in conjunction with severe exertion. A man who is hospitalized for this cause has his attention strongly directed to his stomach, more particularly when he falls into the hands of a certain type of gastro-enterologist. The massive and repeated suggestions derived from his treatment furnish the fulcrum with which he very easily constructs hysterical gastropathy.

In some cases the only symptom of this is persistent vomiting. In these cases however, there is little loss of appetite, and scarcely any falling off in weight, while pain is absent in many cases.

The *circulation* may be troubled by paroxysmal attacks of tachycardia. These are usually provoked by the arousal of emotions in the soldier, more particularly of those which have occasioned his removal from the line. The attack does not occur with the suddenness of a true paroxysmal tachycardia, there is not the sensation of cardiac shock, nor does the feeling of impending dissolution occur. The attack may last only a few minutes, but it may be several hours before the heart beat returns to normal, and it may last some days, although rarely. In some cases there are convulsive attacks in these patients.

These are not necessarily hysterical, however, but may be a direct

[3]See case 6, knee contracture, loc. cit., J. A. M. A., 1912.

reaction of the distressing emotion which occasions the tachycardia.[4] They are, however, psycho-genetic in their manner of provocation.

The so-called *effort syndrome* is sometimes purely hysterical in mechanism. The patient believes that his heart is damaged, the least increase of demand upon it creates apprehension, the apprehension causes an emotional contraction both of heart and blood vessels, with an increase of rate, which being felt, adds to the apprehension and sometimes produces a rise of blood pressure which further increases the cardiac strain. The success of treatment is proportional to the access the physician gains to the initial cause, which is the patient's apprehension. The progressive exercises which have been utilized are perhaps merely efficacious in proportion to their suggestive influence upon the patients.

Tachypnea may be the principal manifestation. In these hysterical cases it is accompanied always by a general agitation excessive in degree, the patient complaining loudly, and marching up and down. There is no proportionate increase of pulse rate, but the patient seeks to remain in bed and begins to gasp upon the least movement. This is a frequent sequence to poisoning by gas, more especially of the irritating kind. It is sometimes difficult to differentiate the part played by respiratory damage from that of psycho-genetic order. Hysterical sequences are, however, common. These complications are very easily removed by appropriate psychotherapy.

Incontinence of urine has been not uncommon. It is either the relapse of a former adolescent incontinence or arises anew during warfare. It has often arisen in consequence of a mild cystitis or in consequence of prolonged fatigue. It is very easily removed by firm psychotherapeutic measures.

MANAGEMENT OF WAR HYSTERIA DEPENDS UPON A CORRECT INTERPRETATION OF ITS MECHANISM

The foregoing considerations will aid us to an understanding of the more simple mechanisms found in the hysteria of war. The case is less easy granting there has been no wound, and where injury has been internal, as in a post-commotional case. Where hysteria is expressed frankly as a psychological state the mechanism is apt to appear a little more complex.[5] However, as in the cases which have a physical expression it is merely a matter of a conditioning of the patient's reactions in conformity with the impression he has gained of the circumstance under which his disorder has arisen.

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[4] See my forthcoming book, "Neurological Disease of Warfare," in discussion of mechanism of these.

[5] See my detailed discussion—"Management of Besetting Fears, Phobias and Obsessions." Differentia of the curable from the obstinate type. *International Clinics*, 1919–20.

It is purely a matter of comprehending his ideas and feelings. In modifying the patient's mental attitude, absolutely essential is it that the physician ascertain this attitude. To do so he must enter into the patient's own thoughts and feelings regarding his condition and that which has led to it. It is difficult for a soldier in the Army to show what he thinks and feels to the army surgeon, who is, of course, an officer. The man's confidence is inhibited by the disciplinary habits he has acquired in the Army. The medical officer who treats these patients must therefore remove, as far as possible, his cloak of office, and persuade the man to regard him for the time being as his personal physician only. When this is done the man can more readily reveal himself and show how he thinks and feels about his condition. The besetting fears which the patient has, the anxieties, the apprehension of difficulty, the feeling of unwillingness, the sentiment of loathing, the melancholic trends, will in this way all be unfolded to the physician who is willing to enter into the patient's thoughts, to understand and sympathize. It is all a question of motive and desire. The eugenist who excited so much commotion at the International Conference in London when he said that he would rather be the son of an efficient burglar than of an incompetent bishop had this principle in mind. The finding of effective motives and the helping of the patient to utilize them is the aim of the psychotherapeutist, and his success in doing so is the measure of his utility to the Army, and indeed to humanity.

It had better be clearly understood from the beginning that if the highly theoretical and often confused concepts regarding hysteria espoused by some neurologists are allowed to influence practice in the Army, there will be an enormous overcharging of the medical services with functional disturbances of this kind. For these concepts entail a consumption of time out of all proportion to what is at the disposal of the medical officer in time of war. Besides which, they are therapeutically incomparably less fruitful than the concept of hysteria which we owe to Babinski, which has enabled neurologists of France to cure generally, within a few days, at least 70 per cent of the hystericals from the front, and now enables those neurologists operating in the army zone to send back to the front almost 100 per cent of the functional disturbances of this nature. Even the most prejudiced will be compelled by the fact of this war to now acknowledge the utility, even if they do not care to face the truth, of the interpretation which traces the induction of hysterical symptoms to suggestion and which demonstrates that the so-called traumatic neurosis differs in no way from pithiatism.[6]

[6] See *American Journal of Medical Science*, 1915, and *Journal Criminal Law*, 1916, for clear discussion of traumatic neurosis.

REACTIONAL TYPES

Patients suffering from psychogenetic troubles may be divided, from a therapeutic aspect, into two types of weighty practical import. They may be called the active, positive hostile type, and the passive, negative inert type. Obstinacy, however, is not a prerogative of the first type, for the inert patient may be exceedingly obstinate even though not actively resistant.

1. The men of the first type are determined to retain their symptoms. They have found their disease a handy method of evading unpleasant duty, and they actively do everything possible to avoid the measures needed for their cure. In some cases they resort to tricks and dodges to deceive the doctors and attendants; in others they bring an active opposition to bear upon his efforts, and in the worst of all they consciously simulate or even openly rebel in order to avoid the issue which they know in their hearts will lead to the disappearance of their symptoms, in consequence of which they will have to return to the duty which they desire at all costs to avoid.

The only way in which they can be cured is by effecting a psychological change in them—the old biblical expression, "to be born again," expresses the end to be aimed at. The morbid desire of the man to remain a patient must be substituted by a new desire, an aspiration towards the life of duty. There are two ways of effecting this. One is by making the hospital and treatment uncomfortable or unpleasant, so that the man, finding that he is out of the frying pan into the fire, begins to change his view and decides to try to get well.

Even when he reaches this stage, however, it is not enough, for he is then only beginning what every pithiatic must go through, namely, the casting off of a morbid habit, whether it is the habit of a vicious attitude or the habit of a non-use. It must not be forgotten that in some instances there are physical consequences of vicious attitudes and these have to be treated. Often their treatment is exceedingly disagreeable, quite apart from the good-will of the patient.

2. The commoner type of patient exerts no active opposition to the treatment, but he is a man ruled by his automatism and finds it very difficult, or even impossible, to himself make the effort necessary to break the acquired habit. Whether it is one of omission or of morbid commission makes no difference in the principle required for its reëducation, for the patient has to be pushed by the doctor into doing that which he is unwilling to do for himself. Sometimes the motive required to rouse him is, as in the case of the first type, dread of the unpleasant. More frequently, however, the method of sidetracking and indirect suggestion is the most rapid and effective in those cases, for in this way

the man falls quickly and almost unknowingly into another automatism, which a skillful doctor takes care is the natural automatism he formerly had.

As, however, influences against recovery are constantly being exercised against these patients, not only by their concealed motives against a return to duty but because of the hurtful insinuations on the part of comrades or relatives, or perhaps, worst of all, on account of a conventional opinion that a neurotic soldier is incapable of further duty, the method of therapeutics, which has as its principal weapon dislike of discomfort, inevitably produces discontent and even rebellion, latent if not overt. This inevitably leads eventually not only to many individual failures but even to a breakdown of the organization which relies upon this method as its sheet-anchor. Accordingly, instead of the motive of repulsion being used, it is infinitely better to employ that of attraction; the former is a derivative of the fear instinct, biologically a negative chemio-taxis; the latter is an integral element of the positive motive-power of existence.

In the process of the inculcation of motive, every teacher of the young since Froebel has learned how vastly superior to the method of intimidation is the method of provoking interest. Even the method of repression is only of use as a means of breaking the chain of attention elsewhere than to the point desired. It is only when the subject becomes actively interested in what is being done that progress is made. So, in patients in whom psychological trends are the root of their disorder the dragooning is only the first step. We are back to the old saying, "The fear of the Lord is the beginning of wisdom." Some people forget that it should not be made the end. Hence, in the case of a pithiatic, he cannot be considered as safely restored until an active motive of desire to return to duty is substituted for his motive of desire to avoid discomfort. In some cases this is merely a flabby acquiescence in a general atmosphere. Such men are always liable to mental contagion, and their future, as their past, is dependent upon their environment. However, even in men of this kind, a course of training can endow them with an astonishing obstinacy in well-doing. Most *a propos* is the profound wisdom uttered by Jeremy Taylor when he saw the criminal led to the scaffold: "There, but for the grace of God, goes Jeremy Taylor." In the situation we are considering the grace of God is represented by the motivation derived by the patient from a skillfully devised environment. Those who have dealt with markedly hysterical cases know how faithful these patients become to a service which they may adopt. This is in virtue of their very defect, namely, the accentuation of their automatism, so that patients of poor judgment

and highly suggestible may be moulded into very useful members of their group, provided they are not asked to step out of their regular groove. Even men who are intellectually quite low in type may be converted into valuable soldiers if this principle is utilized.

In persons of greater intellectual complexity, and particularly where the affectivity requires management, the appeal will have to be less simple, and the patient's own mental resources must be more largely deployed. To do this the physician must have a more extensive knowledge of the patient's personality than in the former cases. This is particularly true in the case of the actively resistant type of pithiatic. We have the right to believe there is a key to every one's heart. It is the psychotherapeutist's business to find it, and, when he does find it, to tax his ingenuity to open the door of an active and useful life to his patient. These men are worth saving, for the very qualities which enable them to resist actively will be of the greatest value to them as combatants.

Personality study is mainly necessary when there has occurred considerable fixation of the patient's hysterical ideas. In the earlier stages their expression is already frank, as in the not infrequent dumbfounded state in which men will often retire from bombardment. In this case an analysis of character is not necessary, for the man can be quickly shaken out of somnambulism and returned to duty. So apparent is this condition that the most important quality required by the doctor here is dynamic volition.

In the more subtle cases the doctor cannot successfully restore them unless he has an exact and clear knowledge of the psychopathical reaction common to these cases, and he also needs the power of penetrating into the patient's psyche. Then he is in a position to lead the patient out of the woods into the light.

An organization which effected this purpose with striking success was that in the 7th Region of the French army. It consisted of a central admission and reception center, where the patients were first examined, but where they also came in contact from the first with a number of soldiers who had been cured of obstinate and long-continued hysteria of physical allure, such as paralysis, contracture, camptorachia, stammering, tremor, etc.

Treatment, however, was not conducted in this center; but the patients, after a period of observation and infiltration by hopefulness, were removed to Salins. There, after another period of collective suggestion in the neighborhood of cured patients, treatment by the rapid method was attempted. It was nearly always successful at the first interview; but care is taken that the improvement obtained is then

FIG. 1.
Hysterical drop wrist before treatment after *wound of ulnar region.*

FIG. 2.
The result of rational persuasion.

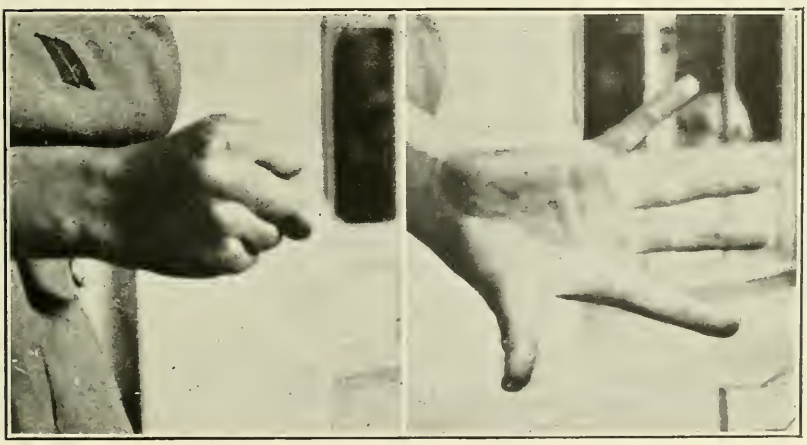

FIG. 3.
Hysterical contracture of the hand before treatment after a *wound of the meta carpo—phalangeal region only.*

FIG. 4.
The result of rational persuasion.

(To face page 558)

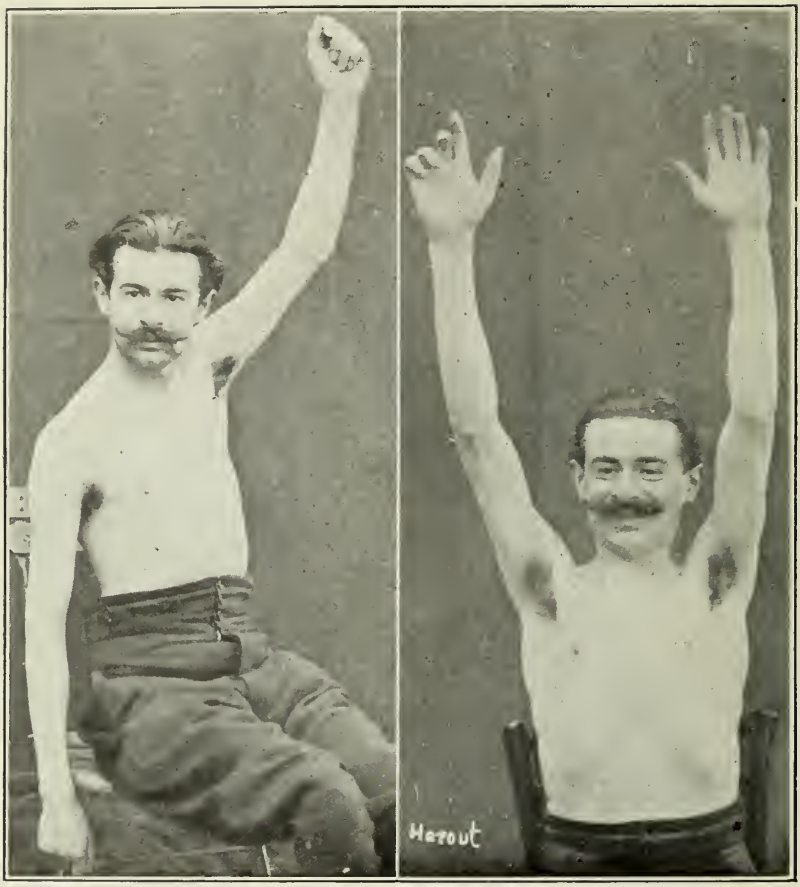

Fig. 5.
Complete right brachial mono-plegia after wound of scapular region.

Fig. 6.
The rapid result of rational persuasion.

maintained by vigilant observation for two or three hours, together with almost continuous exercises during that period under supervision of the instructors who have been trained by the physician for this purpose. After some days or weeks of fixation of a cure, patients are then transferred to a training battalion under officers acquainted with the principles of the treatment and the object to be sought in the fixation of the results. The procedure is described in detail in my forthcoming book in which what occurs in the therapeutic interview is related word for word, and numerous examples are presented.

Relapses of cured hystericals will occur unless the men are imbued with intense military fervor, or those who are not capable of this are met on the lines of communication, at the depot, and in the regiment, by a firmness of dealing gained from instruction of the officers regarding the nature of the condition and the manner of its prevention in cured soldiers. This was accomplished eventually in most of the French army corps, but had not been organized in the A. E. F. when the armistice ended the fighting.

DIAGNOSTIC SERUM FOR B. DIPHTHERIAE

By Major EDWARD H. MASON
Medical Corps, United States Army

DURING the past few weeks there has been conducted at this laboratory[1] a little investigation as regards the specific agglutinability of various strains of B. diphtheriae. This work was started because in a few of the hospitals of this base section certain of the laboratory officers were experiencing difficulty in deciding whether or not an organism was a true diphtheria bacillus, judging by morphology and staining characteristics alone. In consideration of this it seems to me that if a diagnostic serum developed in a rabbit would agglutinate all strains of true B. diphtheriae, and no strains of the pseudo or diphtheroid organisms, it would be of value when any doubt should arise as regards the true nature of a suspected culture.

To date we have been able to run these reactions in sixty-five strains of B. diphtheriae (determined by morphology and staining reactions), and ten cultures of diphtheroids.

The diagnostic serum used was developed in a rabbit, its titre being positive in 1–320. This was developed with strain No. 1. All cultures were isolated in pure culture by plating out the original throat culture on Loeffler's blood serum coagulated in Petri dishes. Agglutination reactions were run with fresh saline suspensions treated at 62° C. for 15 minutes, it being found that a lower temperature for that time would not kill the majority of the strains. After setting up, the reactions were run in a water bath at 56° C. for four hours, then kept in an ice-box over night, being read in the morning. Controls were run with normal rabbit's serum, dilution 1–20 and with saline. Virulence for a guinea-pig was determined with a limited number of the strains, it being impossible to determine it in all cases due to a shortage of animals. These tests were performed by the subcutaneous method. The results are seen in table on page 561.

In addition ten strains of organisms morphologically diphtheroids isolated from various sources, in no case gave any agglutination with the diagnostic serum prepared with strain No. 1 (B. diphtheriae). The controls in these cases were also negative.

From a consideration of the above results, it would appear that the use of a diagnostic serum in determining the true nature of a suspected diphtheria culture would be of value. In only one case out of the sixty-five strains examined did the organism fail to agglutinate, and

[1] Base Laboratory, Base Section No. 1, France, July 1, 1919.

Strain	Source	Case or carrier	Virulence	Highest titre positive	Controls	
					Normal rab. 1-20	Saline
1	Camp Hosp. No. 11	Case	Vir.	1-320		
2	Camp Hosp. No. 11	Case		1-80		
3	Camp Hosp. No. 11	Case		1-80		
4	Camp Hosp. No. 85	Case		1-80		
5	Camp Hosp. No. 11	Case		1-80		
6	Camp Hosp No. 11	Case		1-80		
7	Camp Hosp. No. 85	Case		1-160		
8	Camp Hosp. No. 11	Case		1-160		
9	Camp Hosp. No. 11	Case		1-160		
10	Camp Hosp. No. 11	Case		1-80		
11	Base Hosp. No. 101	Case		1-40		
12	Base Hosp. No. 101	Case				
13	Camp Hosp. No. 11	Case	Vir.	1-160		
14	Camp Hosp. No. 11	Case	Vir.	1-80		
15	Camp Hosp. No. 11	Case	Vir.	1-160		
16	Camp Hosp. No. 11	Case	A. Vir.	1-80		
17	Camp. Hosp No. 11	Case		1-80		
18	Camp Hosp. No. 11	Case		1-160		
19	Camp No. 3	Carrier	A. Vir.	1-80		
20	Camp Hosp. No. 11	Case	A. Vir.	1-80		
21	Camp Hosp. No. 11	Case		1-80		
22	Camp Hosp. No. 85	Case	Vir.	1-80		
23	Camp Hosp. No. 85	Carrier		1-160		
24	Camp Hosp. No. 85	Carrier		1-80		
25	Camp Hosp. No. 85	Carrier		1-80		
26	C. M. D. Lab	?		1-320		
27	C. M. D. Lab	?		1-160		
28	C. M. D. Lab	?		1-160		
29	C. M. D. Lab	?		1-160		
30	C. M. D. Lab	?		1-80		
31	C. M. D. Lab	?		1-320		
32	C. M. D. Lab	?		1-80		
33	C. M. D. Lab	?		1-160		
34	C. M. D. Lab	?		1-40		
35	C. M. D. Lab	?		1-320		
36	C. M. D. Lab	?		1-80		
37	C. M. D. Lab	?		1-160		
38	C. M. D. Lab	?		1-160		
39	C. M. D. Lab	?		1-40		
40	Central Lab. Savenay	Case		1-160		
41	Central Lab. Savenay	Case		1-40		
42	Central Lab. Savenay	Case		1-40		
43	Central Lab. Savenay	Case		1-320		
44	Central Lab. Savenay	Case		1-80		
45	Central Lab. Savenay	Case		1-40		
46	Central Lab. Savenay	Carrier		1-320		
47	Central Lab. Savenay	Case		1-320		
48	Central Lab. Savenay	Carrier		1-40		
49	Central Lab. Savenay	Carrier		1-160		
50	Central Lab. Savenay	Case		1-160		
51	Central Lab. Savenay	Case		1-160		
52	Central Lab. Savenay	Case		1-80		
53	Central Lab. Savenay	Carrier		1-80		
54	Central Lab. Savenay	Case		1-80		
55	Central Lab. Savenay	Case		1-160		
56	Camp No. 3	Carrier		1-80		
57	Camp No. 3	Carrier		1-40		
58	Camp No. 3	Carrier		1-40		
59	Camp No. 3	Carrier		1-160		
60	Camp No. 3	Carrier		1-160		
61	Camp Hosp. No. 85	Case		1-160		
62	Central Lab. Nantes	Carrier		1-160		
63	Camp Hosp. No. 11	Case		1-40		
64	Camp Hosp. No. 11	Case		1-160		
65	Camp Hosp. No. 11	Case		1-160		

none of the strains showed any agglutination in normal rabbit's serum in dilution of 1–20, or in saline.

Due to the closure of this laboratory it is impossible to carry this work further as was originally intended.

A CENSUS OF SUSCEPTIBILITY TO MEASLES AND ITS RELATION TO QUARANTINE PROCEDURES[1]

By Major ANDREW WATSON SELLARDS

Medical Corps, United States Army

IN THE absence of specific prophylactic immunization for the control of measles one must resort to general measures such as isolation and quarantine. These procedures, while they are notoriously unsuccessful in civil life are rather more susceptible of application under military conditions. In a valuable paper, Munson[2] has reported the results obtained in the control of an outbreak of measles at Camp Wilson, San Antonio, Tex. Munson concludes that the disease can be brought under absolute control by the early isolation and segregation of contacts. At Camp Wilson a total of 444 cases of measles occurred among 13,773 troops, representing 23 organizations; with the careful application of preventive measures in 21 organizations, representing 11,362 officers and men, the incidence of the disease was restricted to a total of 105 cases; two regiments comprising 2,411 troops, in which the preventive measures were not fully carried out, developed 339 cases of measles. One of the prominent features of Munson's plan of prevention consists in obtaining a census of each regiment in regard to the susceptibility of the individual soldier to measles. Munson recognizes that such data represent only an approximation; however, he considers that they are sufficiently accurate for practical purposes and that the error lies largely in the direction of soldiers reporting a previous attack of measles when they really never had the disease.

The accuracy of a routine census concerning former attacks of measles among troops will be discussed in this communication. Occasion for obtaining this information developed in connection with work on inoculation of susceptible volunteers with the virus of measles. The statement of the individual soldier was obtained concerning measles, and confirmation was sought by communication with the individual's parents. The discrepancies were numerous and were almost entirely in the direction of soldiers having altogether forgotten definite attacks of measles in early life.

This report will be based upon inquiries made at the base hospital at Camp Meade, Maryland. In taking the census for a given disease, care must be taken to avoid prejudicing the men in any way, for the psychology of the average soldier readily becomes extremely active. For example, as pointed out by Munson, if it is suspected that sus-

[1] From the Base Hospital, Camp Meade, Md.

[2] Munsen, E. L., Military Surgeon, 1917, vol. xl, p. 666; vol. xli, pp. 63, 186, 257.

ceptible individuals may be quarantined and their liberties restricted, there will be a preponderance of immunes reported. In obtaining the statements of the soldiers at Camp Meade, each man was given a card to be filled out by the individual himself according to the following form.

SURVEY OF CONTAGIOUS DISEASES

Name.....
(Last name) (First name and middle initial)

Present Assignment.....

Scarlet fever.....No	Doubtful	YES	At age of.....years
Measles.....No	Doubtful	YES	At age of.....years
German measles....No	Doubtful	YES	At age of.....years
Meningitis.....No	Doubtful	YES	At age of.....years

(Draw circle around correct answer)

On this card, several diseases were included for certain special purposes. For example, in the case of scarlet fever and measles it was desired to obtain immunes for the care of patients on the scarlet fever and measles wards. Incidentally, the listing of a number of infections would probably cause the soldier to consider his answer more carefully, avoiding in part merely perfunctory replies.

According to the replies which were received, one of the two following letters of inquiry was sent to the soldiers' parents:

U. S. ARMY BASE HOSPITAL

CAMP MEADE, MARYLAND.

Dear ————:

1. Your son is a member of this Base Hospital Detachment. He does not remember ever having had measles, scarlet fever or German measles.

2. It is important that you let us know immediately whether he has ever had any of these diseases.

3. After he was born, did any other members of the family have any of these diseases?

4. Please reply on back of this letter and send in enclosed envelope without postage.

Very truly yours,

(Signed) .....

U. S. ARMY BASE HOSPITAL

CAMP MEADE, MARYLAND.

Dear ————:

1. Your son is a member of this Base Hospital Detachment. It is important that you let us know immediately whether he has ever had measles, scarlet fever, or German measles. Your son is perfectly well, but this information is necessary for our statistics.

2. If he has had any of these diseases, please tell me whether other members of the family were sick at the same time.

3. Please reply on the back of this letter and send in the enclosed envelope without postage.

Very truly yours,

(Signed) .....

The replies obtained, even from almost uneducated parents, were unusually clear and precise. In many instances they indicated beyond doubt that the individual in question had had measles. The following copies are characteristic of many of the answers received concerning men who reported confidently that they had never had measles in any form:

PHILADELPHIA, PA.,
2–10–19.

MAJOR A. W. SELLARDS.

Dear Sir: We received your letter in regards to my son John.

John and his bro. and two sisters had the measles at the same time. John was about eleven years old at the time.

Very truly,
(Signed).....

BALTIMORE, MD.,
Feb. 11, 1919.

MAJOR ANDREW W. SELLARDS,
Base Hospital, Camp Meade, Md.

DEAR SIR:

My son John had measles when very small and of course does not remember it, but never had German measles or scarlet fever. His younger brother and sister both had measles and scarlet fever.

Respectfully,
(Signed) .....

SIR:

Chas. had a case of measles when he was 2 years old.
(Signed) .....

The statements of the soldiers and the parents are presented in the following table. The men returning a reply of "doubtful" were too few in number to be of importance in this table.

CENSUS OF MEASLES

Statements of soldiers	Replies of parents.		
Number reporting measles	Reporting occurrence of measles	Reporting no attack of measles.	Indefinite or doubtful replies
144	133	9	2
Number reporting no attack of measles. 89	49	22	18

From this outline it is seen that the vast majority of answers indicating a previous attack of measles were confirmed by the letters from the

parents (92 per cent.) and that a very considerable proportion of answers (55 per cent) indicating no attack of measles were clearly discredited by the parents' statements. A precisely similar result was experienced in taking a census at Camp Devens, Massachusetts. A large number of doubtful replies (18) is listed concerning the men reporting no attack of measles. Sixteen of these represent conditions in which one or more members of the family developed measles and the individual in question, though at home during the period, is reported by the parents as having probably escaped infection; his susceptibility under such circumstances may very well be considered as questionable. There were nine men reporting a definite attack of measles which was not confirmed by the parents' statements; these replies were, in some instances, rather perfunctory. It would seem probable that these men had had measles; certainly the burden of proof would rest with one wishing to establish their susceptibility.

These results introduce an element of doubt into some of the conclusions drawn by Munson. Inasmuch as the number of measles cases developing at Camp Wilson was only one-fifth of the entire number reporting themselves as susceptible, Munson concluded that the preventive measures probably protected four-fifths of the supposedly susceptible men. Of the 89 men at Camp Meade reporting themselves as susceptible, the more reliable information obtained from the parents indicated susceptibility with reasonable certainty in only one-fourth of this number (22 instances).

Summary.—A census of susceptibles and immunes would be of distinct value in attempting to control measles by isolation and quarantine. The statement of the average adult that he has never had an attack of measles is thoroughly unreliable. There are many minor sources of error, but the discrepancy lies predominantly in the direction of immunes reporting themselves susceptible. The incidence of measles during infancy is extremely high; in adult life, the individual himself is unable to remember his infection.

Accurate data concerning the efficacy of quarantine measures in protecting non-immune individuals cannot be computed from the unconfirmed statements of adults reporting themselves susceptible to measles.

EDITORIAL

HONOR AND DISHONOR

We reprint below an editorial from the *United Service Gazette*, issue of August 28. There seems to us to be in it much food for reflection. The analysis of the traits which underlie courage and cowardice is well defined and seems to us that which is generally accepted. A young Frenchman, Paul Lintier by name, analyzes the question of fear in a little book, "Ma Piece," which he wrote before he was killed in action against the Germans in 1916.

His deductions are quite apparently drawn from self-analysis, and his conclusions tally closely with those of the editor of the *United Service Gazette.*

The average man is not a coward, but innate courage must be fortified and accentuated by a certain continued association with the factors which as a whole make up the condition "danger."

The life of the soldier in campaign supplies this daily contact with death, and Lintier holds that the average man under such conditions becomes in a measure inured to the possibility of termination of life at almost any minute. He draws a parallel between the soldier's existence and that of the very old—each with the shadow of eternity ever hovering over him goes his way with the assured calm of the fatalist.

After all, the dividing line between bravery and cowardice is fear.

One fears either that he shall lose his life or that he shall lose his honor. These two influences determine for him into which category he shall fall, and so, in the manner of the Greek Sophist school, we may draw the final conclusion that Courage is really Fear.

W concur in the objection voiced by the editor of the *United Service Gazette* to extending punishment beyond the pale of life. After all there must be a measure of pity for the unstable soul which could not subordinate the terror of death to the fear of living shame. There must be some gear missing in the make-up of those who cannot stand fast, either afraid or unafraid to face the last reality.

And so, if through the judgment of their follow-men and in accordance with the uncompromising demands of war they finally face before a firing squad that which they once fled—"death by musketry"—they have paid their debt to society and the ultimate atonement has been rendered. Have we the right to follow them to the place where they must be judged by the Great Commander?

We think with the editor of the *United Service Gazette* that it were better to cancel the record rather than to perpetuate a disgrace to

which they themselves are oblivious and which would serve only as an ever-present badge of shame to their surviving kin.

James Robb Church.

AN UNFAIR AND NEEDLESS DISTINCTION

It is understood that a difference is to be made in the graves of men killed in action and of those shot after conviction by a court-martial on the charge of cowardice. Now assuredly a soldier can be guilty of no crime greater than that of misbehavior in the presence of the enemy. Yet as regards the marking of graves we agree with the protest of Col. Lambert Ward, D. S. O., M.P., and think that the distinction named should not be permitted. A very wide question is opened up, of course, by the consideration of this matter. There is no quality which man more greatly esteems than courage, and at all times much has been written on the subject. Aristotle, as far as we recollect, discourses on what he terms the five spurious forms of courage, such as the courage of ignorance or the courage of experience. These he distinguishes from natural courage or bravery. And as every man is not naturally brave, it may well be asked why soldiers so rarely seem to lack courage. It is the result of training and discipline. Every soldier was once a civilian, but he does not acquire natural courage, in which he previously was deficient, merely because he became entitled to wear military uniform. But adequate Army training does undeniably instil into him that readiness to render immediate obedience, that self-control, that devotion to duty, that *esprit de corps* which has so often spurred naturally timid men to perform the most heroic deeds. As a matter of fact the man who overcomes innate fearfulness and steadfastly carries out a perilous duty is really more worthy of admiration than the man who feels no fear.

In his "Riding Recollections," if we remember rightly, Whyte Melville devotes two chapters respectively to "Pluck" and "Nerve," and tells a story, which he acknowledges to be impossible, which bears on this point. During one of the actions, the story runs, of the Peninsular War, an insubordinate major observed that his colonel was growing exceedingly pale. "Why sir, I believe you're afraid," he exclaimed. "Yes sir; I am afraid," replied the colonel, "and if you were half as much afraid as I am, you'd have run away long ago." Surely the senior officer's conduct in remaining at his post was more admirable than many a desperate enterprise of a reckless "dare-devil." It is needless to say that we do not desire to make little of natural courage. On the contrary, we believe it justly to have been described as the greatest of all virtues because it makes all other virtues possible. But however severely we may condemn them it is impossible not to feel some pity for the unfortunate men who broke down under the strain of active service.

As Colonel Ward wrote, "Two men, we will say, are living in London. They are in similar circumstances, have more or less similar tastes, and have lived more or less similar lives since they were born. In an air raid both bolt like rabbits to the tube railway for safety. They are accounted wise for this and applauded by their female relations. Later, one is taken under the Conscription Act and put into the Army. His pal, who is the same age and of the same medical category, belongs to a badged trade and thus stays at home and still continues to bolt to the tube when the raiders come over, and is still accounted a prudent man. The other, after three months' training, is sent to France, despatched to the trenches soon after landing, has a bad time there, which culminates in a severe bombardment, compared with which the worst air raid at home is mere child's play, *and is expected to behave like a veteran.*"

Therein lies the whole crux of the matter. The veteran, the adequately trained

man, can be relied upon. We have had proof that the inadequately trained man cannot always be trusted in an emergency. Indeed it is a just cause of pride in the manhood of the nation that in our hastily raised armies so many men pulled themselves together. It was simply marvelous. Imagine the case of these men. They are suddenly plunged into all the racking horrors of front-line warfare. Their minds are shaken. When they come out for rest they dream of these horrors. Before they have time to get over it up they go to the line again. They are shelled on the way up, probably. In the confusion one of them drops out and bolts to a trench or dug-out. His battalion moves on without him. Three or four days later, longer perhaps, he is found behind the lines and is immediately arrested. It is all terribly simple. A court-martial, and he is being tried for his life. "But," as Col. Lambert Ward emphasizes, "the full injustice lies in the fact that, supposing the battalion he was with had a good reputation, the chances are that he would be released under the Suspension of Sentences Act. He would be allowed to rejoin and to wipe out the stain by subsequent good behavior in the front line again. His sentence, one of death perhaps, would then go by the board. But supposing the battalion he was with had been doing badly. Then the chances are that an example would be made of him and he would be shot one chill morning."

Colonel Ward explains that he does not complain of the harshness of military discipline. No one knows better than he does himself how essential the death sentence is in cases like these. As long as there is war, as long as this country fights in war, these terrible things must happen. There is only one way to run war, and that is ruthlessly. From the civilian point of view these things are unjust; but, then, all war is unjust. But, he adds, "the war is over now, is it not? Surely the past should be forgotten. We must not punish a man twice. We have punished his body. We must not punish those in whose memories he still lives. That is double punishment. Let him in his death be treated exactly as those who, perhaps, were only a little more fortunate than he was. Many, many men would rather have had ten years' penal servitude than be sent back to the front line. They only went because they had to. And further, let all trace of his shame be expunged from the books. Let all the records of it be destroyed by the War Office. It is only common fairness in a war such as this has been."

With this opinion we must express entire agreement. "Tout comprendre c'est tout pardonner" is a trite saying, but assuredly it is applicable in the present instance. It is a sad subject altogether. But again must we repeat that justice cannot demand that any stigma should be carried beyond the grave.

BUSINESS AS USUAL

We make the following explanation without comment.

Notice of expiration of subscription to THE MILITARY SURGEON and of dues is mailed on the 20th of the month preceding date of expiration. This gives at least a month for answer. One month after the first bill a second one is sent, and six months later a third. If there is no response to the first bill, the name is taken off the mailing list and carried as suspended. At the end of two years a delinquent is dropped as provided by the Constitution and By-Laws.

Our circulation is the paid circulation. Those who defer payment to the receipt of a second bill cut down the circulation for the month.

Our advertising income is based on circulation. To cut the latter cuts the former. To send three bills costs three times as much as to send one, in addition to affecting the circulation as already stated. Our idea of a secretarial heaven is a place where everyone on receiving his first bill sits down and returns it with a check for continuance or with a resignation, and thus relieves us of an indefinite position like Mahomet's coffin.

Also, we not infrequently receive letters in answer to bills stating that the journal has not been received for—oh, years and years! Please miss it before the bill comes! We work hard to make it readable and we *want* you to get it from month to month. Besides, it takes only one two-cent stamp to send the fiercest kind of a kick. We know that. If you don't get your copy let us know and we will see that you do.

J. R. C.

ASSOCIATION NOTES

The following named officers have been elected to active membership in The Association of Military Surgeons of the United States since the publication of our last list:

Medical Corps, U. S. Army

Lieut. Colonels

Harold Barclay
Oliver H. Campbell
Malvern Bryan Clopton
Arthur H. Cilley
George Draper
Edward Campbell Davis
Martin B. Tinker
William H. Walsh

Majors

Ansel Granville Cook
August Edward Gerhardt
John J. Broderick
Lawrence F. Boland
George Baskervill
James C. Greenway
Charles Warner Jones
Henry James
Jool S. Kelsey, Jr.
Lewis F. Mobley
Arthur T. Mann
Jackson C. Robertson
Roland E. Skeel
Frank Joseph Slader
John J. Sellwood
Joseph Walter Schirmer
Roscoe L. Sensenich
Charles F. Tenney
Hugh H. Trout
Everett L. Goar
William Wallace Gilbert
Walter J. Otis
William Alonzo Searl
Harry Searls Gradle
David H. Lawrence
George Clifton Leachman
Henry Hymen Lissner

Captains

Larcus B. Allen
George L. Armitage
Edwin G. Adams
William J. Anderson
Clarence E. Boudreau
Walter August Burg
James Girard Blower
Richard Clarence Beebe
Sydney Elon Bateman
Samuel Woodman Bradstreet
George Washington Bowman
Osceola J. Brooks
Mortimer T. Cavanaugh
Russell J. Caton
John W. Cornell
Emile Lester Cottrell
William E. Chapman
Marshall B. Catlett
Elbert Learoy Damron
Herman A. Duemling
John H. Digges
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Charles C. Falk
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Samuel R. Guthrie
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Howard Roy Hess
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John V. Johnson
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Oscar J. T. Johnston
Arthur Jordan
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Warner M. Karshner
Charles M. Kent
Paul Leighton Leyda
Fred A. Lieuallen
Harry Stanley Lake
Henry Everett Monroe
Butler Metzger
George A. MacQueen
Francis K. MacMurrough
William D. McCalip
H. Charles Menzies
Wilbert Francis McNary
Thomas Reid McNab
Marion C. Palmer
Charles C. Rentfro
Jacob J. Ross
Wentzle Ruml
G. Hampton Richards
James Oscar Strickland
J. M. Scanland
William E. Sauer
Arthur Blair Shatto
Edgar E. Strickland
Wilfrid D. Sharp
Christopher C. Self
Joseph Schwarz
Paul H. Schaefer
Frank U. Swing
Harve M. Stricklen
Edward R. Schoolfield
Edmund B. Spaeth
William A. Thompson
James C. Tyvand
Gustave A. Thielke
Ralph K. Updegraff
Oscar H. Urstad
Edwin H. Wiley
Louis M. Weinfield
Frederick A. Wicker
Robert E. Windham
Frederick A. Webster
Arthur A. Whittemore
Oliver J. Westlake
William W. Harper
James E. Woelfle
James D. Weir
Michael G. Yeager
George Wesley Beatty
Frederic William Boyd

Captains—Continued

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Frank Edward Dow
Lucien Clyde Fausold
George Washington Fithian
Lycurgus Martin Gurley
Charles E. Harris
Dixi George Hoyt
Guy McKevitt Johnson
Joseph E. J., King
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Leonce Joel Kosminsky
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Abraham Leenhouts
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Dennis William Sullivan
Henry Hubbard Amsden
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George Edward Glover
Louis David Green
Joseph W. Johnson
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Theodore J. Kerr
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Granville Ernest Leavitt
Kenneth A. J. Mackenzie
Roy J. Marshall
Robert C. McCreery
Keith Darwin Mills
Norman D. Murphy
Hugh Edward Prather
William Collins Pumpelly
Arthur Williams Ralls
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Charles Aronson
Emery G. Bouncll
Hugh G. Beatty

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Bernard McA. Bradford
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Festus M. Chaffee
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Clarence C. Elebash
Mortimer A. Ehrlich
Sigo Ehrlich
Wm. M. Empie
J. A. D. Engesather
Herbert W. Ellam
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Leo Faske
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David I. Frey
John M. Fewkes
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David Holden
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Adolph M. Hanson
Michele V. Iovine
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Verner Kennedy
Max Kummel
Charles R. Kerr
Jack R. Lavieri
Samuel E. Leard
Charles W. McLain
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Walter D. Moccabee
Thomas D. Mills
Felix Murphy
Virgil O. Muench
Benj. N. Novy
James T. Nix
A. Null Osborne
Robert B. Oliver
Roy L. Pendergraft
Louis M. Pearlman
Frederick C. Potter

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Clarence M. Reddig
Oscar J. Ruzicka
James G. Rea
Edward F. Slavik
William Daniel Schafer
Allen G. Sampson
Richard W. Sheely
Frederick S. Salisbury
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Leland A. Thompson
H. Roy Van Ness
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Charles McLaughlin
Charles McLaughlin
Kenneth Earl Montgomery
Butler H. Sanchez
Frank Waldo Scott
Lewis J. Siegal
John H. Baird
William R. Blackburn
Frank Robert Braden
Robert L. Cowen
Thomas Valliere Daganult
George E. Deering
Henry DeWitt Duryea
Sereno M. Ferguson
James Edward Grady
Henry Beenwkes Hess
Arthur J. Hewett
Clarence Bronson Kenney
George Ray Lyon
Guel George Morehouse
Theodore William Neumann
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Lieutenants—Continued

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Hugh H. Young
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John M. Steele

Lieut. Commander

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Lieutenants

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Maurice Joses
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Lieut. Commander

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Joseph George Patiky
Ernest Ward

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J. Gardner Smith

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Alphonso J. McLaughlin

Assistant Surgeon

Joseph Edward Wheeler

P. A. Surgeon

David J. Jacobson

A. A. Surgeon

Stephen R. M. Kennedy

Associate Members

Dr. Ejnar Hoff
Thos. M. Haskins
Dr. Wm. Allen Griffith, Contract Surgeon, U. S. Army
Major G. W. Wallarich, S. C., U. S. Army

COMMENT AND CRITICISM

MEDICAL ASPECT OF THE AMERICAN LEGION [1]

At the request of the Director of Publicity of the American Legion we publish the following.—The Editor.

THE ONLY INTEREST IS THE WELFARE OF THE PATIENTS

In the history of all known wars until the nineteenth century, ten times as many died from disease as died from wounds. In the last century from five to two died from disease for every one killed in battle. In this war fewer died from disease than died in battle or from wounds; and if we except the respiratory diseases of influenza and pneumonia, less than one-third as many died of disease as of battle casualties. And as after the Spanish-American War scientific research and methods overcame typhoid, malaria and yellow fever, so we may confidently expect the next decade will overcome pneumonia, influenza, epidemic meningitis and possibly tuberculosis as well. In warfare of airplanes, gas and submarines, the medical personnel at sea or at certain posts with the expeditionary forces ran the same risks as the combatants plus the risks of contact with those infected by epidemic diseases. So who will say that the medical service has a less glorious record than any other branch of the military? No stigma is attached to the United States scientists for inhumane innovations like gas or poison-germ warfare.

For the future, diplomatic and political trends govern the line of study and work with the Medical Department as much as any other department, *e. g.*, if the next war will be in the adjacent tropics the country will need to build a fleet of shallow draft boats, also build land transportation that will not be stopped by sand and arid regions; similarly the medical officers must prepare to conquer tropical diseases and to save those sickened by conditions unique in the tropics. On the other hand, if the next war will be in the far east we shall need many large transports, a fast battle fleet, less subsistence if the Army lives in part on conquered territory, and the medical department must meet oriental diseases like the bubonic plague. Nowadays whole nations go to war, but unlike officers in other branches, such as infantry or artillery, the medical officers in peace or in war practice the same profession. For them there is no complete demobilization from the duty of watching and guarding the health and strength of the nation and its fighters, whether past or present or future fighters.

What shall be the attitude of the medical officers who are in the American Legion and who are not permanently in the Navy or Army?

[1] Read before the Oak Park Post No. 15, American Legion of Illinois, July 15, 1919, by H. S. Huibert, M.D. (Ex-U. S. Navy).

What shall be the attitude of the non-medical military men in the American Legion toward those who practice medicine? What shall be the attitude between the civilian doctors and the men who were in the armed forces? If these problems can be thoroughly studied and satisfactorily solved, the legionaires and the whole nation now and in the future will be benefited, and the interest, the experience and the good-will of the medical officers who served in this war, the doctors who stayed at home and the newly educated doctors graduating each year, will be available for the sick and convalescent in the Legion.

For over twenty years it was so often said of the G. A. R. and of the U. C. V.: "How quickly they are dying off!" Unless there is every step taken to prevent it, the same will be said of us, especially at first those who were gassed rapidly dying of tuberculosis. At the present time there are countless men in civil life who were in the service, who are far below par in health and comfort because of the hardships and conditions they met while in the service. The care for these men is our first duty and must be met at once. One may question, "Are not these men already cared for by existing organizations such as reconstruction hospitals, indemnities, insurance, etc.?" No, not entirely.

Treatment in hospitals and at military bases is a function of the Government, but walking cases who only need office or dispensary treatment in the vicinity of their homes while completing convalescence or while employed should not be sent to hospitals and need not be government patients. However, only the U. S. Public Health Service (U. S. P. H. S.) and military authorities should pass on questions of "in line of duty," of disabilities and of indemnities, and civilian physicians must be most careful to refer to the U. S. P. H. S. all such questions and not to express any opinion involving cause or monetary returns from the Government. We aim to relieve the federal officials of minor cases which can be the more conveniently and expeditiously handled by civilians, but we do not want to interfere with the legally prescribed decisions relative to indemnities nor with hospital care except when authorized to do so by the U. S. P. H. S. or by military authorities.

It has always been tacitly understood that the burden of care in the final stages of recovery must be borne by the families and civil communities. This phase of post-war work has not yet been systematized, and it is the purpose of this paper to plan and to initiate this decentralized organization through the American Legion. In both the Navy and the Army men were discharged from active duty if they were not sick enough to need hospital care, and those in hospitals not needed for further military duty were discharged from the service when symptomatically well enough to complete their convalescence at home.

If a man now returned to civil life becomes incapacitated from causes incurred in "line of duty," he may get treatment from the government, through the War Risk Insurance work of the Public Health Service. But there are hosts whose conditions are too minor or not severe enough to warrant hospital care, or who are not legally disabilities incurred in the line of duty and therefore not suitable applicants for treatment by the Public Health Service, but whose health is such that they are not as well as they might be. Some of these are suffering from the prostration of influenza, others have stiffening joints from wounds, still others have battle dreams and insomnia, yet others are fatigued from the exhaustion of severe campaigning, etc.

Unable to hold down or to seek the jobs offered them, they are a burden to themselves and their families and friends. They discredit our employment bureaus; they contribute too little to the public welfare; they cannot seek to create and maintain happy families, and through neglect they tend to lose self-respect and initiative, thus deteriorating to bums and vagrants as has been the sequel to all other wars.

It is estimated that twenty-eight days of front-line work used up the average officer. There was wastage in men as in material, but the men must be salvaged, whereas wornout guns may be scrapped. Most of the munitions of this war will not be fit for combat duty in the next war, but each man in this war will be worth one and one-half men of equal rank and station and duty in the next war (1928?) if he is now brought to the best possible mental and physical health and maintained at that level. The health of the members of the American Legion is of national importance now and will be of still greater importance in the future.

I therefore propose that the position of the medical officer be created in each temporary post of the American Legion and of each temporary state organization, and that these positions be made permanent at the Minneapolis convention in November, 1919. Doctors who served in the Navy or Army will undoubtedly be willing to treat the men of the Legion who are not in the best health possible, according to their line of practice or specialty. Doctors who did not serve in the Navy or Army will be willing as a sign of their patriotism to help the Legionaires recover as fully as possible from the effects of the war, if they are properly approached by the local posts. Dentists, pharmacists, the nursing staffs of institutions, and all others in work allied to medicine will nobly respond to offer their services if there is a well-organized popular demand and recognition for their services.

I suggest that to the post of the medical officer of the local, state and national bodies men be selected who are of broad vision, tact, aggres-

siveness, executive ability, and of high professional standing. They may well be assisted by a medical committee. The medical officer and the medical committee will gather data and information about the sick in the past. It is not intended that they shall themselves treat these sick, but they should supervise and coördinate their care by those to whom the sick are properly referred for treatment. They will make arrangements with local and district physicians, surgeons, dentists, pharmacists, hospitals, out-patient departments, clinics, societies, etc., for care and supplies, in return for public recognition of the services; free or at cost if the soldier cannot pay.

Assuming that there will be a veterans' organization in every community, large and small, for the call for volunteers and the draft reaching every community, the system of local care will be decentralized more than any government agency can decentralize or infiltrate. In the absence of red tape and correspondence the sick or wounded veterans will not hestitate about applying to designated local ex-service physicians as to whom they should go to receive the best available treatment, and "home-town" pride will diminish grumbling. If the way to get treatment is made prompt and easy and if the initiative rests on the soldier and his family, then the fear of further separation from home and the tendency to neglect the important last steps of treatment will diminish and coöperation and a spirit of optimism in eventual cure will be enhanced.

CONCLUSIONS

1. The advice and help of the medical branch of the military service deserve respect because it has increased the combat strength of armies tenfold.

2. Military medicine will change to prepare for the next war according to the trend of national policies and interests.

3. The American Legion must interest itself in the return to full health and effectiveness of its members, for their own and its sake, and for the safety of the nation at the next trial of military strength.

4. Present organizations such as reconstruction, war risk insurance, hospitals and insurance indemnities are not sufficient and should be reserved for serious cases, but need to be supplemented by doctors now in private practice, experts in every line, who are the best in each community, and civil practitioners, who should receive public recognition for their services.

5. Each post, each state organization, and the national body of the American Legion must have among its duly constituted officers and committees a medical officer and a medical committee to arrange for treatment of the Legionaires not still under government care whose

health is in any way impaired by the war and who may be brought nearer to perfect health.

6. Those soldiers who are unable to pay should get treatment free or at cost, care being taken not to pauperize ex-soldiers on the one hand nor to overtax the medical profession on the other.

IMPORTANT PRECAUTIONS IN ADMINISTERING ARSPHENAMINE AND NEOARSPHENAMINE[1]

Experience has shown that the untoward results occasionally associated with the administration of arsphenamine are due in a large measure to the use of too highly concentrated solutions of the drug, to too rapid administration, and to insufficient care in rendering the solution slightly alkaline.

The reader, therefore, may be interested in studying the following instructions just issued to medical officers of the Public Health Service regarding the administration of arsephenamine and neoarsphenamine. Careful observance of the precautions here described will reduce the number of reactions from the use of these drugs.

GENERAL DIRECTIONS

The ampule, before opening, should be immersed in 95 per cent alcohol for 15 minutes in order to detect any crack or aperture not primarily recognizable. (Should such a breach be discovered, the contents of the ampule should be discarded.)

Arsphenamine

1. *Solution.*—Cold, boiled, freshly distilled water should be used in all cases except in the case of "arsenobenzol" made by the Dermatological Research Laboratory, in which case hot water is required. No more solution should be prepared at one time than can be given in 30 minutes.

2. *Neutralization and alkalinization of the above solution.*—With a graduated pipettte or burette add 0.9 cc. of normal NaOH for each 0.1 gm. of the drug (*i.e.*, 5.4 c.c. for each 0.6 gm.). The alkali should be added all at once and should quickly convert the acid salt solution of arsphenamine into the alkaline salt solution, or the disodium of salt of the arsphenamine base. (The solution of arsenobenzol, which is hot, should be cooled before adding the alkali). This represents slightly more alkali than just enough to redissolve the precipitate formed by the addition of this reagent.

The alkali used should be standardized against normal acid. Normal NaOH is a 4 per cent solution of the c. p. product. However, if made on the basis of weight, it may be considerably less than this

[1] Reprint from the Public Health Reports, vol. 34, No. 21, May 23, 1919, pp. 1131 1133.

strength, hence the necessity for titration. It could be made up in amount sufficient for a month's use if kept in a well-stoppered bottle and exposed to the air for only a few seconds at a time when using the solution. It should be kept in a bottle that has been used for NaOH solution for some time, so that all action it causes in the glass will have occurred. Where it is impossible to have this made up at the station, it will be furnished upon request from the Hygienic Laboratory. Should the NaOH solution become cloudy or contain a precipitate, it should be discarded.

3. *Concentration of the drug.*—It is desired to emphasize the fact that the concentration of the drug should not be greater than 0.1 gm. to 30 c.c. of final solution. The practice of using concentrated solution is not only in direct conflict with the instructions on the circular, but carries a distinct hazard to the patient.

4. *Method of injection.*—The gravity method only should be used. Where several patients are to be injected from the same solution, the container for the solution should be graduated. If not already graduated, this can be done in a few minutes by sticking on a strip of adhesive plaster and marking the graduations on this. A convenient way to do this is to have each mark represent 30 c.c., with a long mark for each 180 c.c.; then, if the volume is made up so that each 0.1 gm. of drug is contained in each 30 c.c., the doses can be given accurately. It is a great convenience to have a glass stopcock near the glass tubing, which serves as a window just above the needle in order to control the rate of injection. If no stopcocks are at hand, the rate can be controlled by the size of the needle and the height of the column of fluid. A No. 18 or 20 B. & S. gauge is the best sized needle.

5. *Rate of injection.*—Operators should pay particular attention to the rate of administration and in no case should it exceed 0.1 gm. of drug (30 c.c. of solution) in two minutes. This point is especially emphasized because it is believed that excessive rapidity of administration accounts for more unfavorable results in the use of arsphenamine than any other one thing.

Neoarsphenamine

The principal precautions to be observed in the administration of neoarsphenamine are:

1. Only a single ampule should be dissolved at a time. This drug must not be dissolved in bulk to be given to a series of patients.

2. Cold water only should be used.

3. The dilution should be not stronger than 0.1 gm. of the drug in 2 c.c. of freshly distilled water.

4. A very small needle should be used, and the time of injection of the dose should not be less than five minutes.

SOUTHERN MEDICAL ASSOCIATION

Thirteenth Annual Meeting, Asheville, North Carolina, "Land of the Sky," November 10–13, 1919.

Monday, November 10: Section on Urology, Section on Pediatrics, National Malaria Committee (Conference on Malaria), Southern States Association of Railway Surgeons, Conference on Medical Education, Southern Gastro-Enterological Association, and at night a public meeting under the direction of the Section on Public Health.

Tuesday forenoon: The formal opening with the addresses of welcome, address of the president, Dr. Lewellys F. Barker, the Orations on Medicine, Surgery and Public Health, etc.

Tuesday afternoon, Wednesday and Thursday: Section on Medicine, Section on Public Health, Section on Surgery and Section on Eye, Ear, Nose and Throat. Also on these days the American Child Hygiene Association (formerly the American Association for the Study and Prevention of Infant Mortality).

Tuesday night: A big general meeting early in the evening followed by a reception to the president at the famous Battery Park Hotel.

Wednesday night: Another general meeting.

A great program, delightful entertainment, beautiful scenery, balmy climate, fine hotels and plenty, reduced rates on all railroads—everything just ideal for this meeting.

UNITED STATES CIVIL SERVICE COMMISSION, WASHINGTON, D. C.,
September 10, 1919.

THE EDITOR.

SIR: The commission requests that you assist it in filling a number of administrative positions under the recently created Interdepartmental Social Hygiene Board, by inserting the following in your journal as an item of news.

Your cooperation will be appreciated.

By direction of the commission:

Very respectfully,

MARTIN A. MORRISON,
President.

GOVERNMENT WANTS WORKERS IN VENEREAL DISEASE CAMPAIGN

The recently created Interdepartmental Social Hygiene Board of the United States Government is in need of a number of specially trained men and women to complete its organization. The United States Civil Service Commission has announced examinations for the following positions: Chief of division for scientific research, $3,500 to $4,500 a year; chief of division for educational research and

development, $3,500 to $4,500 a year; educational assistant, $2,800 to $3,600 a year; chief of division of relations with states, $3,500 to $4,500 a year; chief of division of records, information and planning, $3,500 to $4,500 a year; supervising assistant and inspector, $2,800 to $3,600 a year; field agent, $1,800 to $3,000 a year. All positions are open to both men and women.

Applicants for these positions will not be given scholastic tests in an examination room but will be rated upon their education, experience, and writings. Published writings of which the applicant is the author will be submitted with the application. For most of the positions a thesis on one of a number of given subjects will be accepted in lieu of published writings. The receipt of applications will close on November 4. Detailed information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or from the secretary of the United States Civil Service Board at the post office or custom-house in any of 3,000 cities.

The law creating the Interdepartmental Social Hygiene Board provides for the coöperation of the War and Navy Departments and the Public Health Service of the Treasury Department for the prevention, control, and treatment of venereal diseases. The duties of the board as set forth in the act are: (1) To recommend rules and regulations for the expenditure of moneys allotted to states for the use of their respective boards or departments of health in the prevention, control, and treatment of venereal diseases; (2) to select universities, colleges, or other suitable institutions which shall receive allotments for scientific research for the purpose of discovering more effective medical measures for the prevention and treatment of venereal diseases; (3) to recommend such general measures as will promote correlation and efficiency in carrying out the purposes of the act; and (4) to direct the expenditure of certain moneys appropriated by the act.

A REPORT ON 351 HERNIOTOMY CASES[1]

The following 351 cases of hernia were operated upon at this hospital since March 1, 1919; practically all of these men were overseas, and the hernias either developed in the service or were aggravated by service:

Single indirect inguinal, 147; single direct inguinal, 34; bilateral indirect inguinal, 46; bilateral direct inguinal, 20; recurrent, 20; a total of 333 inguinal hernias.

There were also: Femorals, 11; epigastric, 5; incisional, 2.

Of the 239 indirect inguinal hernias, 199 were complete and 40 incomplete. Seven of the 40 incomplete hernias were single and the remainder associated with some type of hernia on the opposite side.

The following conditions were found associated with the cases operated: Hydrocele, 3; varicocele, 3; sac containing adherent omentum, 7; sac containing adherent bowel, 1; sac containing inflamed appendix (appendectomy), 1; sliding type, 3; undescended testicle, 1; bladder accompanying sac, 2; femoral with bladder accompanying sac, 1.

The following preparation was used:

[1] By Major Walter H. Vosburg, M. C., U. S. A. Report of hernia cases operated upon at Base Hospital, Camp Upton, New York, during the past six months.

All patients were given an enema the morning of the operation but no cathartics unless there was much constipation, when castor oil was given the night before. The patient was shaved, the field of operation was scrubbed with soap and water the previous day, and instructions given to take a hot bath and scrub genitals thoroughly. No dressing was applied. On the table the field was washed with gasoline, dried, then with alcohol and dried; and following this a coat of tincture of iodine was applied. With this method of preparation there was an infection of 1¼ per cent or a total of five cases. All of them were superficial and did not interfere with good union. All were staphylococcus aureus type and occurred in double hernia cases where both sides were operated upon at the same sitting. In the first three there was no change of gloves or instruments for the second side. In the last two which occurred, however, they had been changed. Until the last infection took place, 3½ per cent iodine had been used on the skin, but since then the tincture has been substituted and no infections have occurred. This period includes about one-third of the cases operated.

Bassini technique was followed in 241 cases, Bassini with Bloodgood modification (transplantation of the rectus muscle) in 78, Ferguson in 2, Halstead in 1 and Wyllys-Andrews in 8. The femoral hernias were treated by the Bassini method (high ligation of sac and attachment by deep mattress sutures of the pectineal aponeurosis as high up as the pectineal eminence, to Poupart's ligament).

No. 00 plain catgut was used for ties and No. 1 chromic to suture the conjoined tendon to Poupart's ligament (usually three interrupted sutures, sometimes four) and for the external oblique fascia. Interrupted No. 00 chromic was used for the skin and superficial fascia. Every effort was made to avoid trauma and to limit the amount of catgut to be left in the wound, only sufficient being used to obtain and maintain proper apposition until union had taken place.

An unusual number of cases required catheterization at least once or twice following operation.

Sutures were removed on the seventh day. All patients were kept in bed for two weeks; those with recurrent hernias, or those in which the rectus had been transplanted, a few days longer.

As the patients were awaiting discharge from the service and anxious to get home, they were usually discharged from the hospital during the fourth week. Those to remain in the service were sent to the convalescent center during the fourth week and retained there about two weeks before being sent to duty.

There were two cases of hemorrhage in wounds following operation,

both recurrent hernias. One occurred a few hours after operation and one five days after operation. Wounds were opened, bleeding point ligated and there was no further trouble. There were no other complications.

No recurrences have been reported, but of course it is too early to judge results. We are keeping a record of the cases operated with their home addresses and hope to report results in a year.

Practically all of the cases were operated upon by Maj. Walter H. Vosburg, Lieut. S. S. Friedman and Lieut. Robert S. Dinsmore.

STANDARDIZATION OF AMPUTATIONS

By Major THOMAS G. ORR
Medical Corps, United States Army

The more I see of amputations the more the need of their standardization has impressed me. For some years standardization of the treatment of fractures has been urged, and very properly so, because standardization of their treatment, in so far as is possible, will be a great help to the physician, especially to him who is not skilled in mechanical surgery and treats only an occasional fracture case.

It seems that amputations would be even more suitable for standardization than fractures because this field of surgery is much more limited and much less difficult.

The world war has stimulated new interest in amputations and the treatment of the amputated. Never before has the fitting of artificial limbs so much interested the medical profession. In doing an amputation the chief idea of the surgeon in the past has been to cure the patient of his ailment and obtain sound healing, with little regard for the later fitting of an artificial prosthesis. Surgeons who have taken part in the surgery of the war, especially those who have done reconstruction work, have, for the most part, had the importance of function and the return of the soldier to the life of a self-supporting citizen so firmly instilled into their minds that future amputations will be done by them, when possible, at the site best suited for artificial limb fitting.

Numerous articles have been written since the beginning of the war on the best locations for amputation from the fitting standpoint. While these points are very well established, they may require some changes in the near future due to the development of limb-making and fitting. The actual technique of amputation best suited for comfortable and efficient limb fitting has not been sufficiently emphasized. The best method of

making flaps, treatment of nerves, bone and periosteum could, with the vast war material, be very accurately established in the next few years.

Some of us can now realize the trials that the artificial limb-maker has had in the past and the much greater trials of the patient with the poorly planned amputation. We can understand why there are patients who prefer a life on crutches to the inconvenience and discomfort of an artificial limb. Many patients could have been saved a life of dependency or partial dependency if the operating surgeon had been familiar with the orthopedic side of amputations. The proper methods of preparing stumps for limb fitting and the means to employ to prevent deformity after amputation should be familiar to every general surgeon. It should be the duty of every operator who does amputations to do them in such a way and in such a location that the patient's future comfort and earning capacity be maintained. It should be his further duty to impress the patient with the necessity of early limb fitting and treat him as any other patient requiring a brace or appliance. The patient should not be turned loose to be supplied with a limb without proper medical supervision.

Modern text-books do not sufficiently emphasize and explain the best methods and best locations for amputations. Old illustrations, which may be misleading to the student or physician, are passed on from year to year. The amputation from the standpoint of limb fitting should be given greater consideration.

These brief suggestions are made with a hope that some means will be soon devised by which every surgeon may have impressed upon him the best and accepted methods of doing amputations.

BOOK REVIEWS

La Prothese Fonctionelle Des Blesses de Guerre, by Dr. Ducroquet, Orthopedic Surgeon to the Rothschild Hospital. With a preface by Prof. Aug. Broca. 233 pages with 218 original figures. Paris: Masson et Cie., 1919. Price, 5 fr.

This little book of 233 pages is divided into twelve chapters and illustrated by 218 drawings, all original and drawn under the direction of Dr. Ducroquet. The book is a valuable addition to the literature of functional prothesis.

The author first describes the different methods of fixation of apparatus to the lower and upper extremities, the axes and mechanisms of articulation.

The different kinds of appliances described are: First, those for immobilization, those for limited movement, those whose object is to permit the patient to move around without compromising the repair of lesions of the extremities, and apparatus for paralyses.

Numerous types of orthopedic shoes are described and illustrated.

After using many illustrations of the moving-picture type showing the normal movements of the extremities and of the body in locomotion, the author takes up the different ankyloses of the inferior extremities and the changes noticeable in locomotion. The tibio-tarsal joint is first discussed with its therapeutics, orthopedic and surgical; then the ankyloses and limited motions of the knee and the hip are described. This is followed by a discussion on fractures and pseudo-arthroses of the lower and upper extremities, with their orthopedic and operative treatment.

An interesting study of the different muscles which functionate in the movement of the extremities is given, and how to demonstrate the action of each.

The paralyses are well described and many types of mechanisms for their support are illustrated, as are also apparatus for contractures and muscular lesions.

Jno. E. Summers.

The Principles of Nursing, by Charlotte A. Brown, R.N., Superintendent of Nurses in the New England Hospital for Women and Children, etc., etc. Illustrated. Philadelphia and New York: Lea and Febiger, 1919. Price, $1.75.

The author has prepared a concise and understandable elementary text-book on the *principles of nursing*. It is practical in its method of instruction, the clinical features being emphasized throughout. It can be recommended as a desirable text-book for young nurses beginning their hospital training, or for anyone wishing to obtain a knowledge of the fundamentals of nursing.

Francis M. Munson.

Ultra-Violet Rays in Modern Dermatology, by Ralph Bernstein, M.D.; Professor of Dermatology, Hahneman Medical College, Philadelphia, etc., etc.; Author of Elementary Dermatology, etc. Lancaster, Pa.: Achey and Gorrecht.

The author has given to the profession, in a practical way, the results of his clinical experience with the use of ultra-violet radiations in the treatment of the various skin diseases for which he has found the ultra-violet light a desirable agent. The subject is presented briefly and with clearness, and with no intention of going into histo-pathologic details. The book is printed in large type and is amply illustrated.

Francis M. Munson.

The Hatchet of the United States Ship "George Washington," Compiled by Capt. Edwin T. Pollock, U. S. Navy, and Lieut (j.g.) Paul F. Bloomhardt, Chaplain Corps, U S. Navy, 1919, 300 pages, illustrated; track chart in colors; 2nd edition. The Navy Relief Society, Washington, D. C., and 280 Broadway, N. Y. Price, $2.00.

This volume, attractively gotten up and well printed, is a collection of the issues of this seagoing newspaper which received extensive notice during its life, and also has considerable interesting information which is published for the first time. It is interesting not only as a unique piece of work, but also in the way of reminiscence from the daily sidelight which it gives as to our progress in the affairs of the war. Captain Pollock, the able and enthusiastic managing editor, had the advantage, as his associates on the editorial staff, not only of those who made up the crew of the ship but also of those who were passengers on her. In this way he was able to impress into service some very able talent to supplement the efforts of the regular staff. There is much that is interesting and much that is amusing in the issues, and it is a book which it is not bad to have as a reminder that the Yankee nation, even in its most serious mood, never altogether loses sight of the lighter side of things. We call attention to the quotation: "The net proceeds from the sale of this book are to be used for the relief of widows and orphans of enlisted men of the Navy and are to be handled by the Navy Relief Society, Washington, D. C., from whom copies of the book can be obtained." It is therefore evident that the purchaser of a copy not only gets value received for his investment but is also helping along in a material way a work which must, without question, appeal to us all.

James Robb Church.

Gunshot Injuries to the Blood-vessels Founded on Experience Gained in France During the Great War, 1914–1918, by Sir George Makins, G.G., M.G., C.B., President, Royal College of England; Surgeon to St. Thomas Hospital; Honorary Major General and late Senior Consulting Surgeon to the Expeditionary Force in France. Bristol: John Wright & Sons, Ltd.; London: Simkin Marshall, Hamilton, Kent & Co., Ltd., 1919.

This interesting volume is an amplified and revised edition of several papers already written upon the war wounds of blood vessels by this eminent author of war surgery, while in a special section, there appears the material of the great war from which his views have been deduced.

As stated in the introduction, war wounds of the larger vascular trunks and their outcome have been of special interest in the treatment of gun injuries for all time. Our knowledge as to the general behavior exhibited by these lesions has undergone little material change. For instance, the features of blood-vessel wounds related to the tendency to spontaneous cessation of primary hemorrhage; the frequency with which these injuries are attended with secondary hemorrhages; and, finally, the frequent occurrence of the various forms of traumatic aneurysm remain very much the same.

In this war valuable data have been gained on the signs of injuries to arteries by examination of the peripheral and vasomotor nervous systems; by the value of auscultation, local and over the artery, and also of the precordial region, and, further of the actual mode of development of some of the arterial injuries. The effects of the obliteration of the main vessels upon the vitality of the parts supplied by peripheral branches has been again studied with profit. Some valuable data have been acquired on the exact cognizance of the nature of the primary anatomical lesions of the

vessels, as well as the arrangement of the vessels in relation to the various forms of traumatic aneurysm.

The relative advantages of obliterating the main vessels by ligature, the simultaneous occlusion of the artery and vein, and the attempt to maintain their viability by suture have been carefully noted. In the last method military practice was much curtailed by the septic nature of the wounds concerned. For this reason primary or early suture that was looked forward to with so much promise in the earlier part of the war had to be abandoned for a considerable time pending improvements in the general treatment of war wounds.

The prevailing characteristic features of vessel wounds in this war have materially changed as compared to those noted in the Spanish-American, Anglo-Boer and Russo-Japanese wars. In the latter wars the armament was principally the hand rifle of the foot troops, the reduced caliber rifle employing a steel-clad bullet of 26-30 calibers. The velocity of this projectile was about three times that of the old infantry rifle bullet. Its transit through tissues was so rapid that the vessels had no time to be pushed aside. They either suffered contusion, partial division or complete division.

In the present war, as noted by the author, the employment of every ancient form of missile has materially modified the nature and severity of vascular lesions. The nature of the wounds to blood vessels was in part not unlike those of our civil war, when contusion and laceration of blood vessels were so frequent. This came from the use of shrapnel balls in the earlier part of the world war, and the later employment of high explosive shells and bombs. The shrapnel ball and shell fragments were animated by low velocity, hence the occurrence of contusion and laceration to vessel coats. The employment of vast numbers of machine guns, which used the armored rifle bullet with rather unstable velocity and frequency of ricochet in flight to disturb the angle of the bullet with its line of flight, made lodgement laceration and contusion of tissues generally much more frequent.

This valuable volume is accompanied by four colored plates and sixty illustrations which give varied pictures of blood-vessel lesions and their results.

Coming from the pen of an author whose writings have taken high rank in military surgery for more than a quarter of a century, we have no hesitation in citing this production as one of the most valuable contributions to our medical literature that has come out of the great world war.

Louis A. La Garde.

INSTRUMENTS AND APPLIANCES

THE TRANSPORT SPLINTS OF THE AMERICAN EXPEDITIONARY FORCES

By Lieut. Col. ROBERT B. OSGOOD, M.C., U. S. A.

(With nine illustrations)

EARLY EXPERIENCE OF AMERICAN SURGEONS

CERTAIN officers of the Medical, Reserve Corps of the United States Army had been fortunate enough to have served with the French and English Medical Departments before the United States entered the war. Several of these officers were on the staffs of the first six base hospital units which went abroad in May, 1917, to take over certain British general hospitals situated in France. These general hospitals received wounded from British casualty clearing stations in the zone of the advance, or in times of push directly from the front lines before any definitive surgery had been done.

The previous experience of these officers was of great value to them in the treatment of the battle casualties and afforded them an unusual opportunity to compare the routine French and British treatment of the bone and joint lesions. These lesions comprised about 50 per cent of the casualties, and in both armies their importance was at once appreciated.

IMPORTANCE OF BONE AND JOINT LESIONS

This importance was due not only to the frequency of their occurrence, but also to the serious nature of the lesions. The immediate seriousness was due to the state of "shock" which was so commonly associated with injuries of the joints and the larger bones. This made early surgical interference hazardous. The future seriousness was due to the potentially crippling nature of these lesions because of frequent interference with joint motion and because of the common deformities of alignment. Unless successful early closure has been possible, the chronicity of these cases is striking. It is caused by infection, which is nearly always present, and by the subsequent osteomyelitis which nearly always ensues.

FRENCH SYSTEM

The French, early in the war, began to appreciate the necessity of giving these cases special attention and providing specially trained medical officers. Thus the eminent gynecologist, Gossett, became their eminent joint surgeon; Heitz Boyer, the eminent genitourinary surgeon, became their eminent fracture specialist; and Chutro, from

the Argentines, developed the treatment of osteomyelitis to its highest point. There was no successful attempt, however, on the part of the French to standardize the special apparatus for the treatment of these bone and joint battle casualties, which resulted in uniform methods of transport. Various types were tried, and various opinions existed as to the value of these types. When once the cases arrived at the special hospitals, their care became consecutive and under the supervision of one man in control of a chain of hospitals and directing a special group of medical officers. The transport of the wounded from the battlefield to the evacuation hospitals continued to be in the hands of the stretcher-bearers and the regimental surgeons, and perhaps less uniformity in the methods of splinting obtained than experience has shown to be advisable. In the evacuation and base hospitals much individual ingenuity was exercised and important and efficient apparatuses were devised. But here again observation seemed to show no standard methods of treatment. We were informed by Miss Cassette, who was assigned by the French government to the task of devising specialized apparatus for the treatment of bone and joint and muscle lesions, that over 300 different types had been employed.

BRITISH SYSTEM

The British made a more determined attempt to standardize their methods of transport splinting. The Thomas leg splint and Murray's hinged modification of the Thomas arm splint grew to be very generally employed as time went on.

As late as the summer of 1917, however, the wounded were arriving at the British casualty clearing stations and were being transported thence to general hospitals in the advance zone in various types of immobilizing apparatus of more or less merit.

Until late in the war, no scheme of unified control of this splinting had been worked out, although its importance had been appreciated by Maj. Gen. Sir Robert Jones very early, and an earnest attempt had been made to bring it about.

STANDARDIZATION SUGGESTED, FOR A. E. F.

Consultation concerning these matters and experience in the treatment of the British wounded led to an attempt on the part of the American orthopedic surgeons serving with the British to standardize transport apparatus. The purposes of this standardization were to simplify the methods by selecting only the most efficient apparatus. If the choice lay between two types of equal efficiency, the type easiest to manufacture and transport was always selected.

After a study of the problem for several months, these surgeons became convinced that a solution could be reached by selecting seven

types of simple splints. Drawings of these were made and submitted to the Chief Surgeon, A. E. F., in August, 1917. Almost at the same time, an offer was received by the Chief Surgeon from the French branch of the American Red Cross, to manufacture and supply all the splints necessary for the American Expeditionary Forces.

Our casualties were expected to begin in the late fall or early winter, and the necessity for speed was evident if we were to be prepared to treat the wounded efficiently and have sufficient time to train the large number of American surgeons who were coming over to serve and whose experience in the treatment of this class of casualties in civil life had been very small.

Immediately after these drawings were submitted to the Chief Surgeon, Order No. 73, A. E. F., was issued. The board was directed, as will be noted, to standardize the surgical dressings and appliances, as well as to standardize the splints. These surgical dressings were to include those for the front line work and the base hospitals. They were to be manufactured and furnished by the French Branch of the American Red Cross.

[*Extract*]

HEADQUARTERS AMERICAN EXPEDITIONARY FORCES

Special Orders No. 73. FRANCE, *August* 20, 1917.

. . . . .

17. A board of medical officers is hereby appointed to meet at these headquarters, at the call of the president thereof, for the purpose of investigating and reporting upon the advisability of standardizing certain appliances to be used by the Medical Department and upon completion of this duty will return to their proper stations. Detail for the board:

Lieut. Col. William L. Keller, M. C.
Maj. Robert B. Osgood, M. R. C.
Maj. Alexander Lambert, M. R. C.
Maj. Joseph A. Blake, M. R. C.
Capt. W. S. Baer, M. R. C.
Capt. Nathaniel Allison, M. R. C.
The board will be guided by instructions from the Chief Surgeon.
The travel directed is necessary in the military service.

. . . . .

BY COMMAND OF MAJOR GENERAL PERSHING.

Official: JAMES G. HARBOARD,
BENJ. ALVORD, *Lieut. Colonel, General Staff,*
Adjutant General. *Chief of Staff.*

This board met in Paris, as directed, on August 28, 1917, and on September 9, 1917, two representatives of this board, with a fair copy and the original drawings of a proposed manual which the board had been ordered to prepare, reported to the Chief Surgeon, A. E. F., at Chaumont, where the Headquarters of the American Expeditionary Forces and the Medical Headquarters were located.

The text and illustrations were reviewed by the Chief Surgeon and, with the incorporation of certain suggestions made by him, were approved.

They were then transmitted by him in person, accompanied by the two representatives of the board, to the Commander-in-Chief, A. E. F., on the same day. After a careful survey of the proposed manual the Commander-in-Chief gave his approval by signing the following letter:

HEADQUARTERS, AMERICAN EXPEDITIONARY FORCES
OFFICE OF THE CHIEF SURGEON

September 9, 1917.

From: Chief Surgeon,
To: Commander-in-Chief, A. E. F.
Subject: Report of a Board convened for the purpose of standardizing certain Medical Department supplies.

1. Inclosed herewith is the report of the Board convened by Paragraph 17, Special Orders, No. 73, Headquarters, A. E. F., France, August 20, 1917.

1 incl. (Signed) A. E. Bradley.

Approved:
John J. Pershing,
Major General.

The foreword of this manual will outline its purpose.

In accordance with Special Order No. 73, A. E. F., August 20, 1917, the Board of Medical Officers directed to investigate and report upon the advisability of standardizing certain appliances to be employed and issued by the Medical Department of the United States Army makes the following report:

This board met as directed, and in its report recommends that in addition to standardizing the manufacture of splints and appliances a manual describing their proper use be published and distributed to all United States Army medical officers at home and abroad.

Essentials for Standard Splints

The board was unanimous in its opinion that the splints and appliances officially adopted by the American Army should possess the following qualifications:

1. Efficiency and correct mechanical principles.

2. Simplicity of design and low cost of construction so that sufficient quantities may be always available.

3. Transportability, in order that an efficient splint may be applied at the front and remain *in situ* until the patient reaches the more or less permanent base hospital, and, if occasion demands or the surgeon elects, may even be expected to make possible an entirely satisfactory end result, without change of the type of splint.

The Medical Department has no desire to dictate the exact line of treatment which shall be employed in the base hospitals. It is the desire, on the contrary, to encourage ingenuity in devising better methods for the treatment of these bone and joint injuries, which comprise so large a proportion of the battle casualties. The board is convinced, however, after a careful review of existing methods in the armies of the Allies and enemies and a personal experience in the active treatment of these lesions in the present war, that the simple apparatus recommended may be employed with entire satisfaction as to the end results, and without any great degree of previous training.

The board believes that with the three types of wire-ring traction and counter-pressure fixation splints embodying the Thomas principle, the Jones "Cock-up" "Crab" wrist splint, the long interrupted Liston splint with adjustable foot piece, an anterior thigh and leg splint, Hodgen type, the Cabot posterior wire splint, the wire-ladder splint material, light splint wood, and plaster of Paris bandages and Bradford frames, treatment of all bone and joint battle casualties may be efficiently carried out at the front, and, if necessary, in base hospitals.

Advantages of Standardization

Holding this belief, they have been influenced in thus restricting their recommendations to the above types of splints and splint material by a consideration of the following advantages which their universal use would secure:

1. Possibility of quick manufacture and ease of distribution, thereby making available large numbers of splints of unit construction.

2. The combination of traction and fixation in the same apparatus, thereby favoring the comfort of the patient and avoiding the necessity of accessory adjustment.

3. Universality of type and simplicity of mechanical principle, thereby insuring quick familiarity with their uses and efficient application by the surgeon.

The board believes that it is the first duty of all surgeons to become familiar by actual practice in applying the splints to living models, with the methods herein recommended, the mechanical principles underlying these methods—namely, fixation and traction—and the details of the apparatus advised.

Since the successful treatment of these injuries depends so much upon the absence or limitation of infection in these compound fractures, they have seen fit to discuss the primary dressings and the line of mechanical after-treatment found most constantly to favor the healing of wounds, the union of bones, and the restoration of function.

It will at once be obvious that this manual does not aim to be a complete treatise on the treatment of this class of lesions. Its purpose is to put into the hands of the military surgeon a practical, time-saving guide, in which the text has been made completely subservient to graphic illustration.

The board considers that the simplification of methods and apparatus is of supreme importance, not only in the immediate care of the wounded, but in diminishing the national burden of the cripple.

The board wishes to express its gratitude to Mrs. Cyrus W. Thomas for her voluntary and patriotic service in making the drawings for this manual, and to Mrs. Gertrude Austin for her most valuable cooperation in connection with the dressings and surgical supplies.

Approval having been gained, and permission to accept the offer of the French Branch of the American Red Cross to be responsible for the publication of the manual having been granted, one of the representatives of the board was delegated to proceed to the front line and observe the transport of the wounded, in order that the board might be fairly certain that its decisions were correct.

STANDARD SPLINTS AT THE FRONT

The Ypres sector, which was active at this time, was chosen, passes were obtained, and the conclusions of the board were verified. One

of the members of the board had been ordered to England for service with the British under Maj. Gen. Sir Robert Jones. This member was entrusted by the Red Cross with the duty of having the manual published and an edition of 25,000 shipped to the American Medical Supply Depot at Cosne, France. The first copies of this manual were shipped to this Supply Depot in early November, 1917, and from this time on copies were available for free distribution to every medical officer in the American Expeditionary Forces. The book was issued as a regular army manual for the Medical Department of the United States Army Expeditionary Forces in a small waterproof, khaki-colored volume of 190 pages and index, size 6½ inches by 4½ inches and opening the long way. The text described the different splints with line-drawing inserts and enumerated the types of lesions for which the particular splint was to be employed. It also described the dressings. One special series of these dressings deserves mention—the red, white, and blue packets, wrapped after sterilization in stout brown paper and marked by a red, white or blue band. The whole packet was then immersed in liquid paraffine which rendered it almost entirely moisture proof.

The Red packet No. 1, for small wounds, contained the following supplies:

1. 2 unbleached muslin bandages 4 inches by 5 yards cut on the bias; 2 safety pins 1½ inches long are attached to each bandage.

2. A muslin bag, opening at one end containing the sterile dressings which comprise: (*a*) 1 toothpick swab wrapped in oiled paper to be used for applying alcohol or iodine. (*b*) 2 cotton tampons. (*c*) 4 gauze wipes, 4 inches by 4 inches (for cleansing the wound). (*d*) 1 absorbent pad, 4 inches by 6 inches, attached to a muslin bandage 2 inches by 7 feet long, for final application to the wound.

The white packet, No. 2, contains:

1. 2 unbleached muslin bandages, 5 inches by 5 yards, cut on the bias; 2 safety pins 1½ inches long are attached to each bandage.

2. A muslin bag, opening at one end containing the sterile dressings comprise: (*a*) 1 toothpick applicator wrapped in oiled paper to be used for applying alcohol or iodine. (*b*) 4 cotton tampons. (*c*) 4 gauze wipes, 4 inches by 4 inches. (*d*) 1 gauze wick, ½ inch by 8 inches. (*e*) 1 absorbent pad, 5 inches by 7 inches, attached to a muslin bandage 2 inches by 7 feet long, for final application to the wound.

The Blue packet, No. 3, contains:

1. Two unbleached muslin bandages, 6 inches by 5 yards, cut on the bias; two safety pins, 1½ inches long, are attached to each bandage.

2. A muslin bag opening at one end containing the sterile dressings comprise: (*a*) 1 toothpick applicator wrapped in oiled paper to be

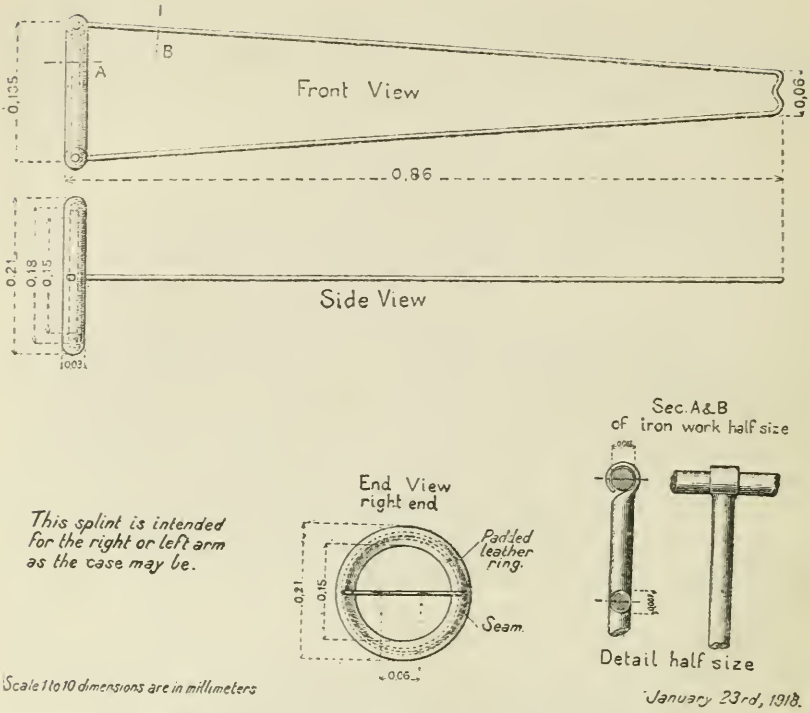
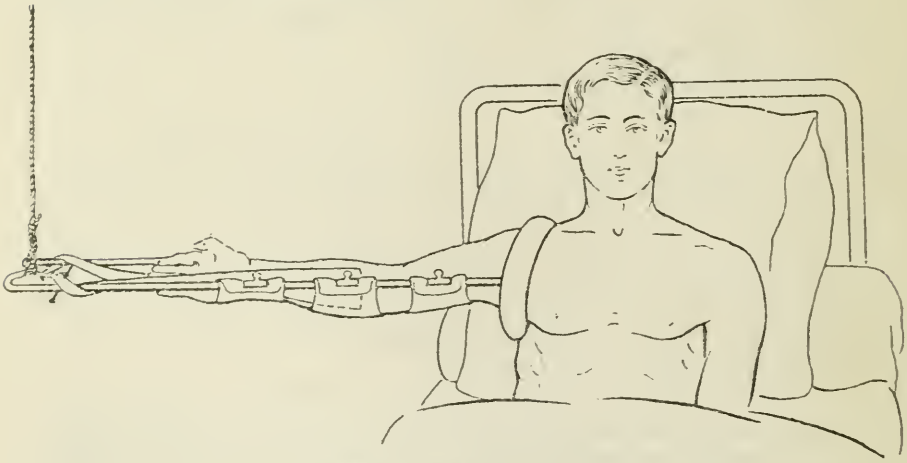

Front View
Side View
End View
right end
Padded leather ring.
Seam.
Sec. A&B
of iron work half size
Detail half size
This splint is intended for the right or left arm as the case may be.
Scale 1 to 10 dimensions are in millimeters
January 23rd, 1918.

Fig. 1.—Mechanical Drawing of Thomas Traction Arm Splint.
(For bed treatment chiefly.)

Uses.—(*a*) Injuries to the shoulder joint. (*b*) Injuries to the shaft of the humerus. (*c*) Injuries to the elbow joint. (*d*) Injuries to the forearm.



Thomas Traction Arm Splint.
(Applied for bed treatment.)

used for applying alcohol or iodine. (*b*) 6 cotton tampons. (*c*) 6 gauze wipes, 3 inches by 7 inches. (*d*) 2 gauze wicks, 1 inch by 15 inches. (*e*) 1 absorbent pad, 11 inches by 12 inches, attached to a muslin bandage, 4 inches by 7 feet long, for final application to the wound.

These proved of great value in the advanced zones and served their purpose admirably. They could be transported in open baskets without danger to their sterility from moisture.

Following the text of the manual were blank memoranda pages and, following these, line drawings and legends. The line drawings consisted of illustrations of the splint itself with the splint applied on the right-hand page and the legend in bold type on the left-hand page. The standard dressings and the various appliances recommended for base hospital use were also illustrated. More memoranda pages were inserted between the illustrations, and a full index. An elastic band retained the covers of the book, whose size was planned to fit into the side pocket of the regulation army tunic.

An attempt was made to furnish a practical working edition which could be used in poor light and which would stand hard usage. It seems to have fulfilled its purpose.

The second edition of this manual has been published in accordance with Special Orders No. 284, October 11, 1918. The medical officers serving on this board were: Brig. Gen. J. M. T. Finney, M. C.; Colonel William L. Keller, M. C.; Lieut. Col. Nathaniel Allison, M. C.; Lieut. Col. Joseph A. Blake, M. C.; Lieut. Col. Joel E. Goldthwait, M. C.; Lieut. Col. William S. Baer, M. C.; Maj. Sidney R. Burnap, M. C.

In this new edition, extra illustrations were inserted and detailed working drawings of the splints. An open abduction arm splint was added to the standard transport splints.

STANDARD TRANSPORT SPLINTS SELECTED

The seven transport splints illustrated were:

1. *The Thomas Arm Splint* and Murray's hinged modification of this, specially designed for transport in order that the arm might be approximated to the side and slung to a stretcher bar. The motion of the splint being centered to the same axis as that of the shoulder joint, slight movements of the limb did not cause any relaxation or tightening of the desired traction. (See Figs. 1 & 2.)

2. *The Jones Humerus Traction Splint* which was to be used in cases in which flexion of the elbow at right angles was desirable, and traction on the humeral shaft was necessary. (See Fig. 3.)

3. *The Thomas Traction Leg Splint* and the half ring modification of Colonel Keller and Colonel Blake. No splint used in the war has gained

a larger number of enthusiastic supporters. It has received warmest commendation from all those surgeons who have seen it in action in the front, have learned the few essentials of its use and have had the opportunity of observing the cases as they came into the Casualty Clearing Station or the Evacuation Hospital with the splint properly applied. Fractures of the femur represent very serious casualties and

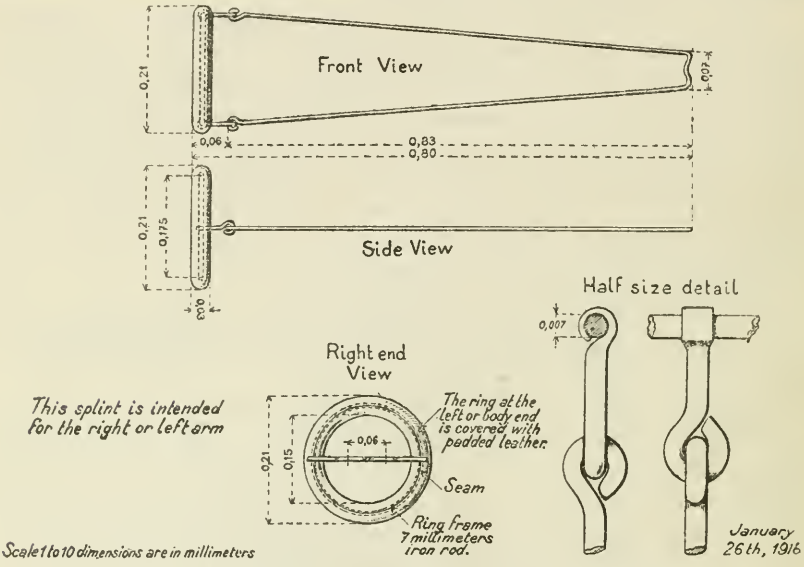
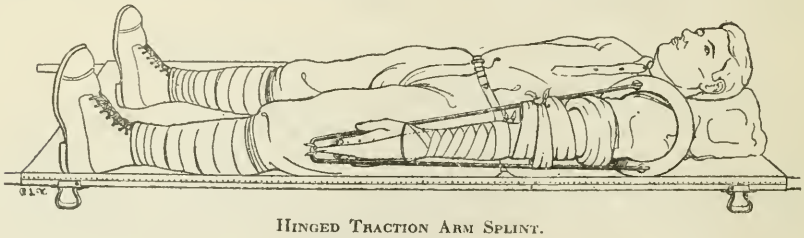


Fig. 2.—Mechanical Drawing of Hinged Traction Arm Splint.

Uses.—(*a*) Injuries to shoulder joint. (*b*) Injuries to shaft of humerus. (*c*) Injuries to the elbow joint. (*d*) Injuries to the forearm. Should always be used as splint for transportation.



Hinged Traction Arm Splint.
(Applied for Transport.)

without proper splinting show a high mortality. The Thomas leg splint has greatly diminished this danger and lowered the mortality. One of Colonel Crile's axioms for the avoidance of shock reads, "Throw the Thomas splint as far forward as possible." (See Figs. 4 & 5.)

4. *The Long Liston Splint* with wire bridge interruption over the pelvis or the hip, and with a right angle foot-piece for adjusting the

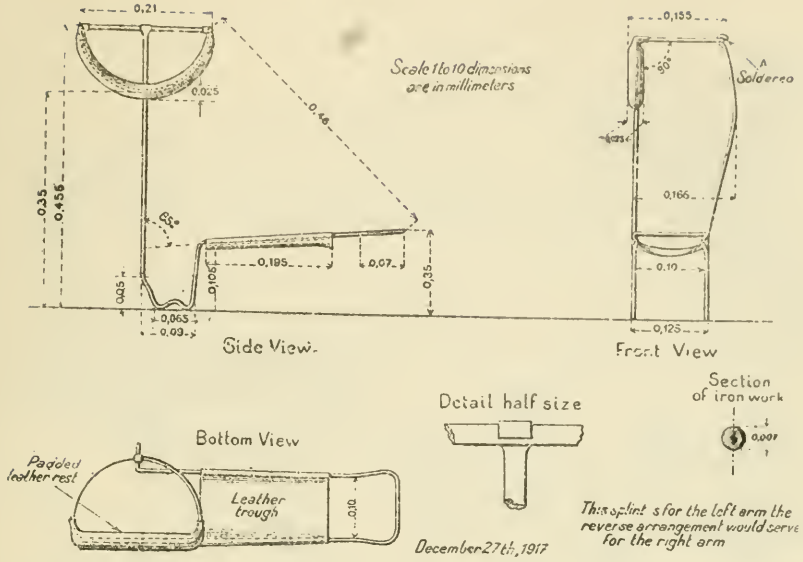


FIG. 3.—MECHANICAL DRAWING OF JONES HUMERUS TRACTION SPLINT.

Uses.—(*a*) Injuries to shaft of humerus in which traction on the humerus and flexion of the elbow oint are desired. (*b*) Injuries to the elbow joint in which flexion is desired. (*c*) Injuries to the forearm.

JONES HUMERUS TRACTION SPLINT APPLIED.

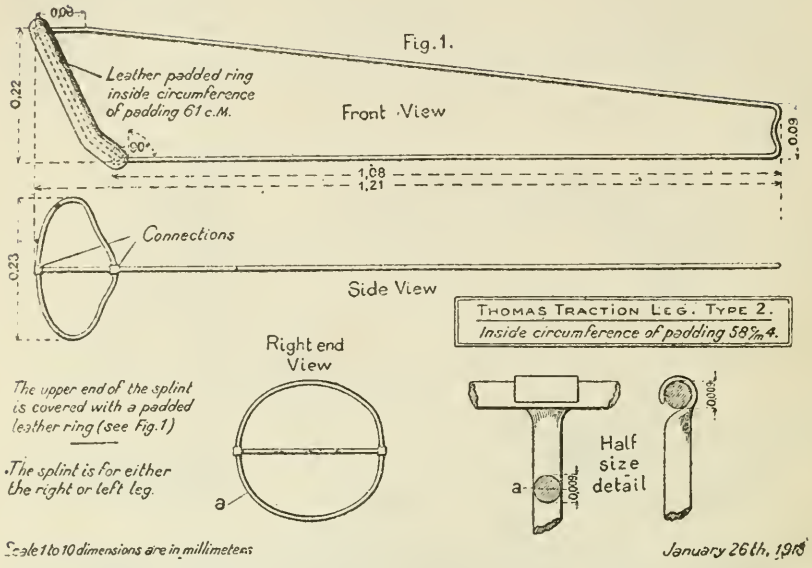
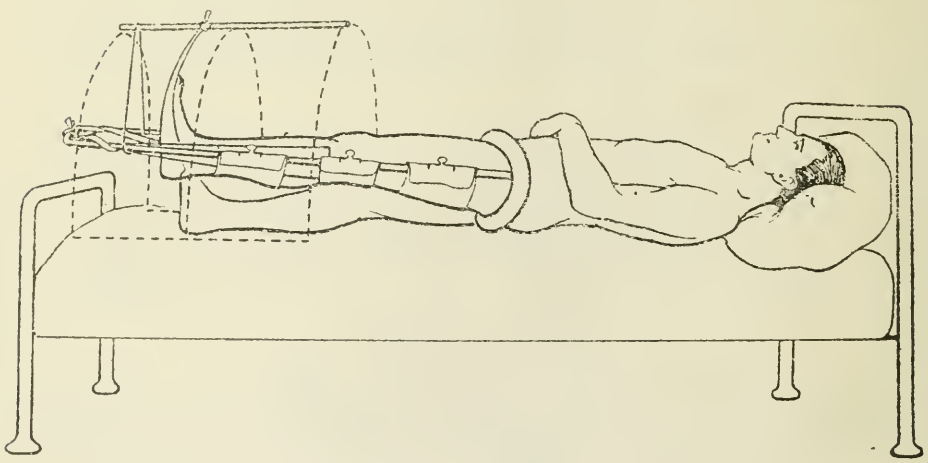


FIG. 4.—MECHANICAL DRAWING OF THOMAS TRACTION LEG SPLINT.

Uses.—(*a*) Injuries to the shaft of the femur. (*b*) Injuries to the knee joint. (*c*) Injuries to the leg.



THOMAS TRACTION LEG SPLINT APPLIED.

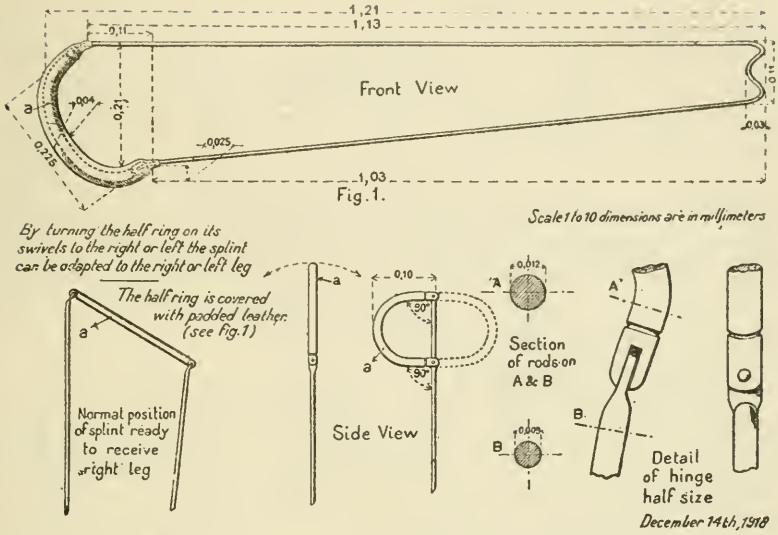
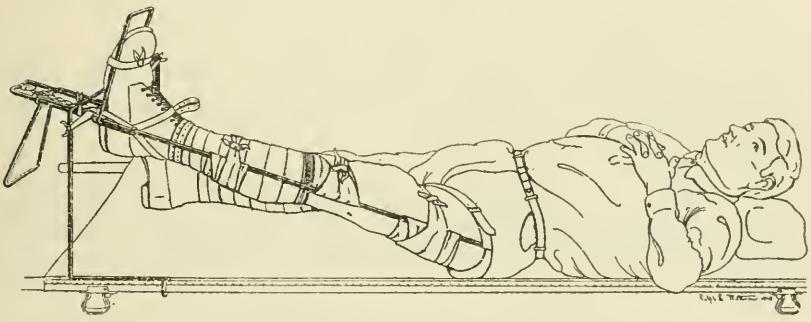


Fig. 5.—Mechanical Drawing of Hinged Half-ring Thigh and Leg Splint.
(For transportation use.)

Uses.—(*a*) Injuries to the shaft of the femur. (*b*) Injuries to the knee joint. (*c*) Injuries to the leg.



Hinged Half-ring Thigh and Leg Splint Applied for Transport.

length of the splint, was included for the treatment of the comparatively rare fractures of the neck of the femur in which the wound would be pressed upon by the ring of the Thomas splint, and also for fractures of the pelvis. This, and the Crab wrist "cock-up" splint of Jones (sec 6), were the only departures from the otherwise universal selection of the wire splints. The long Liston splint was little used, but the board considered it the simplest and most efficient transport splint for these rather infrequent lesions. It served its purpose. (See Fig. 6.)

5. *The Cabot Posterior Wire Splint* was included as representing the best form of "ham" splint, retaining its position on the limb and maintaining the foot at a right angle with the leg. It was not employed for fractures except those of the ankle, but only for soft part wounds, contusions and simple joint injuries, always in combination with two side splints of the ladder splint material. (See Fig. 7.)

6. *The Jones "Crab" or "Cock-up" Splint,* designed to hold the wrist in dorsi-flexion and capable of being bent to any angle and acting as a simple immobilization splint. (See Fig. 8.)

7. *The Ladder Splint Material* was universally liked and proved most adaptable. It was furnished in 30-inch lengths and consisted of two lateral galvanized wires crossed every ¾ of an inch by a small 1-16-inch wire soldered to the side wires and bent into a slight concavity. It could be cut by pliers and made to serve as a hand, foot, forearm, or elbow splint where a mobilization only was needed. It was clean, light and compact. (See Fig. 9.)

SPLINT DRILLS

In all divisions the different drills in the application of these standard splints were given to the regimental surgeons and stretcher bearers by the orthopedic consultants. The drill for the application of the Thomas leg splint planned by the British, and adopted in our own army, will serve to illustrate these drills.

"The Thomas outfit" consists of a stretcher on trestles; three blankets; primus stove; Thomas splint (largest size); reversible stirup (Sinclair's); three flannel bandages (6 yards); four triangular bandages; dressings; safety pins; coaptation splinting (10 by 6 inches and 8 by 6 inches).

The personnel required consists of an operator, No. 1 assistant and No. 2 assistant (if available).

When not in use the splint is kept hung up. The five slings of flannel bandage are rolled round the inner bar of the splint, the leather is kept soft by saddle soap, and the iron bars are smeared with petrolatum.

The indications for front line application are:

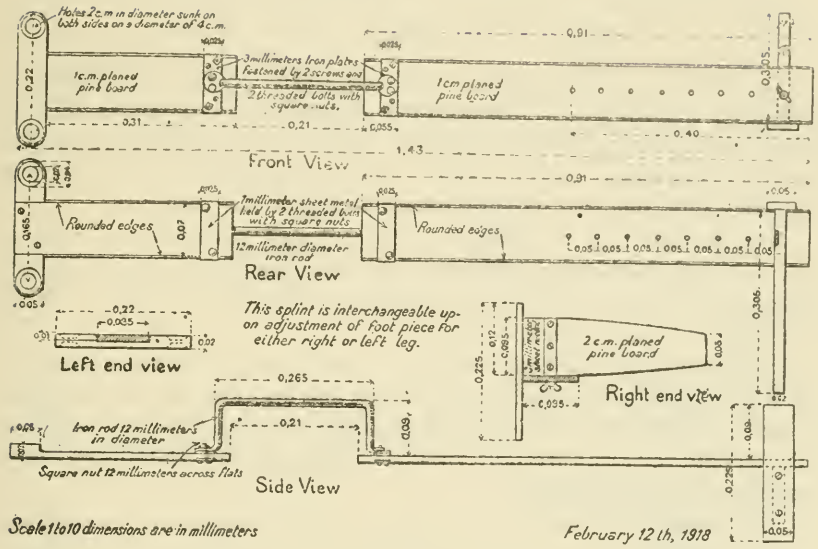
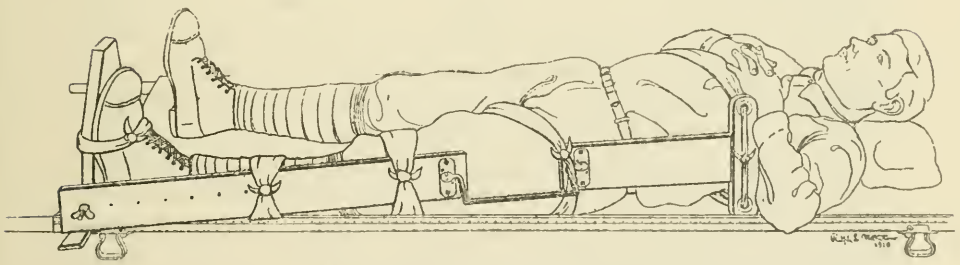

Holes 2 c.m. in diameter sunk on both sides on a diameter of 4 c.m.
1 c.m. planed pine board
3 millimeters iron plates fastened by 2 screws and 2 threaded bolts with square nuts.
1 cm planed pine board
Front View
Rounded edges
7 millimeter sheet metal bent by 2 threaded bolts with square nuts
12 millimeter diameter iron rod
Rounded edges
Rear View
This splint is interchangeable upon adjustment of foot piece for either right or left leg.
Left end view
2 c.m. planed pine board
Right end view
Iron rod 12 millimeters in diameter
Square nut 12 millimeters across flats
Side View
Scale 1 to 10 dimensions are in millimeters
February 12 th, 1918

Fig. 6.—Mechanical Drawing of Long Liston Splint with Interrupting Bridge of Iron Wire.
Uses.—(*a*) Fractures of Pelvis. (*b*) Fractures of Hip Joint.



Long Liston Splint Applied for Transport.

1. For all fractures of the thigh bone, except where there is an extensive wound in the upper part of the thigh or buttock which would interfere with the fitting of the ring.

2. In severe fractures of the knee joint or upper part of the tibia.

3. In certain cases of extensive wounds of the fleshy part of the thigh.

DETAILS OF THE THOMAS SPLINT DRILL

I. Warning (Rechauffment).—On the word "one," the stretcher, placed on trestles with a primus stove beneath, is prepared as follows: The first blanket is folded lengthwise into three; two folds lie on the stretcher, one hangs over the side. The second blanket is arranged in the same way, one fold hanging over the side of the stretcher.

The patient now is placed on the prepared stretcher and lies on four folds of the blanket; the two folds hanging down form a hot-air chamber. The third blanket is placed across the patient's chest while the splint is being applied.

II. Extension.—On the word "two" the No. 1 assistant stands at the foot of the stretcher facing the patient and opposite the injured limb. Grasping the heel of the boot with his right hand and the toe with his left, keeping the arms straight, he exerts a steady pull, thereby producing the necessary extension.

No. 2 assistant stands by the injured part and supports the fracture above and below.

III. Clove-Hitch.—On the word "three" to form the clove-hitch the operator takes a length of 9 feet of flannel bandage. Holding it in the left hand by its midpoint, he grasps the center of the left half with his right hand, palm to the right, and makes a loop which is carried up and passes behind the left hand, thus forming a clove-hitch with a diameter of 10 inches. This is applied over the boot, with the short end on the outer side; the long end is carried under the instep, up and through the loop round the ankle. The two extension bands thus produced are ready to be attached to the splint later on.

IV. Splint.—On the word "four" the operator threads on the splint, No. 1 assistant removing and reapplying upper and lower hands alternately to allow the ring to be passed over the foot. The splint should be pushed up under the buttock as far as possible, care being taken to keep the notched transverse bar horizontal.

No. 2 assistant, as before, steadies the thigh.

V. Fixation of Leg.—On the word "five": 1. The extension bands of the clove hitch are tied around the notched bar at the end of the splint as follows. The outer band is passed over and under the bar, and then round the notch, drawn taut, and held over to the opposite side. The inner band is passed under and over the bar, then also round

the notch, where it crosses the first band and prevents its slipping. The two are finally tied off by a half bow.

2. The middle flannel sling is tied behind the knee, which is held partly bent by No. 2 assistant.

3 and 4. The slings behind the ankle and the calf are tied, so that the leg now rests in a shallow trough, with its center on a level with the long bars of the splint.

5. To prevent the leg rising off the splint, the center of a narrow fold bandage is placed across the leg, just below the knee, the ends

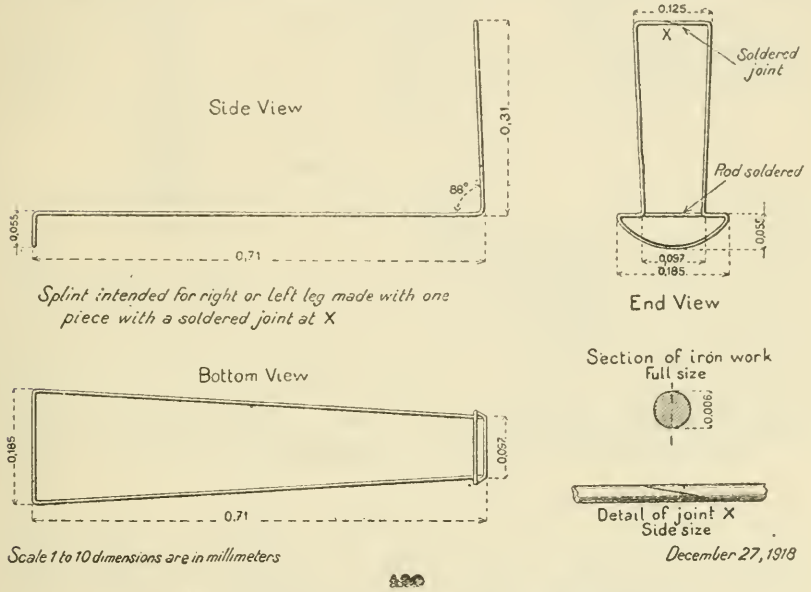


Fig. 7.—Mechanical Drawing of Cabot Posterior Wire Leg Splint. (To be used with or without side splints.)

Uses.—(*a*) Injuries to the soft parts of the lower limb requiring fixation in transport. (*b*) Slight injuries to the knee or ankle requiring fixation in transport. (*c*) Fractures of the fibula. (*d*) Wounds of the ankle joint. (*e*) Injuries to the foot.

The rods of the splint should be thoroughly padded and they may be bent to allow flexion at the knee if desired.

Side splint of wood or wire ladder may be used in connection with the splint if desired.

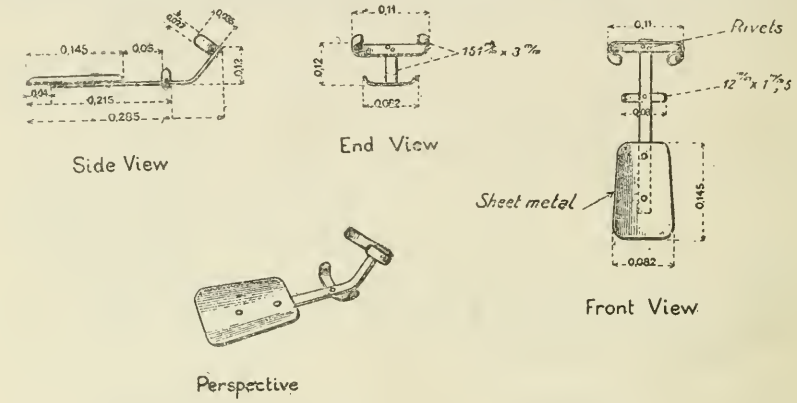
are carried down between the leg and the splint, brought up outside the bars and then tied in front of the leg. The lower limb is now firmly fixed in a position of extension, and it may be moved freely without causing pain to the patient or damage to the injured part.

VI. Dressing Wound of Thigh.—On the word "six" the wound is exposed by cutting away the overlaying portion of the trousers on the front or back of the thigh, and the dressings are then applied.

VII. Coaptation Splints and Bandages.—On the word "seven" the Gooch or coaptation splints are applied. The short piece is placed

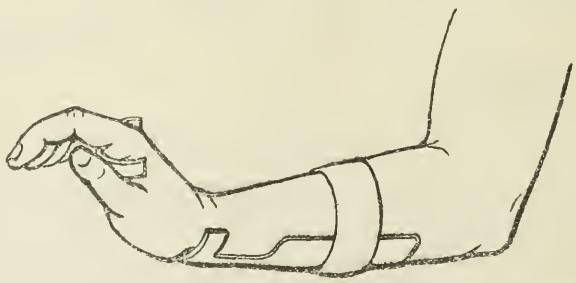
behind and secured by tying the remaining two slings. The long piece is placed on the front of the thigh, care being taken to avoid pressure on the knee cap. The whole is now retained in position by the two narrow fold bandages, carried round the thigh outside the bars of the splint.

VIII. Stirrup and Figure of Eight.—On the word "eight" the stirrup (Fig. 1) is sprung into the splint above the ankle, its foot toward the stretcher. A bandage is then applied to form an additional sling and by a figure of eight turn to prevent lateral movement of the foot.



Scale 1 to 10 dimensions are in millimeters

Fig. 8.—Mechanical Drawing of Jones "Cock-up" or "Crab" Wrist Splint



Jones "Cock-up" or "Crab" Wrist Splint Applied.

IX. Spanish Windlass.—On the word "nine" the extension bands are tightened, and a small piece of wood or a nail is introduced to increase the tension by twisting up as required.

X. Pad in Ring.—On the word "ten" a pad is placed inside the ring on the outer side of the thigh to act as a wedge and prevent undue movement.

XI. Suspension Bar.—On the word "eleven" the suspension bar is fitted to the stretcher with the "feet" away from the rackets. The

splint is slung up three finger breadths from the horizontal part of the suspension bar. To damp down the side movements, lateral tapes are tied to the uprights. For the journey in a motor ambulance an additional band may be passed from the splint round one handle of the stretcher.

XII. Hot-Water Bottles and Blankets.—On the word "twelve" hot-water bottles are applied. The third blanket is folded into two lengthwise, and laid over the patient. The hanging folds of the first and second blankets are brought up over this so that the patient is evacuated with four folds of blanket in front as well as behind.

The record time in the British Army, somewhat bettered in our own, for the complete application of the Thomas splint in accordance with the details of the drill was two minutes, and every stretcher-bearer was expected to be able to apply it in less than six minutes.

SPLINT SUPERVISION

Orthopedic consultants were assigned to every division and in many divisions, in addition, there were orthopedic surgeons acting directly under the division surgeons almost as regimental surgeons. These medical officers assisted in giving the splint drills and, in times of combat, carefully supervised and inspected the direct application of the splints to the wounded. They saw to it that ample supplies of splints were kept in all the battalion aid posts. As a result of this supervision the wounded arrived at the evacuation hospitals, almost without exception, well splinted.

MANUFACTURE OF SPLINTS

As soon as the manual above referred to was approved, models of these splints were furnished to the American Red Cross and their manufacture and storage immediately begun. Many small mechanics shops in Paris were converted into splint shops. French mechanics were trained and the most excellent work turned out under the supervision and constant inspection of the American Red Cross. Except for a few thousand splints of the types common to both British and American armies, which were purchased by the American Government from the British, the entire splint supply of the American Army was manufactured by the French Branch of the American Red Cross.

SUPPLY OF SPLINTS

The supply of splints was, at times of great pushes, sometimes strained, but was kept up to the demand to an unhoped-for degree. The weekly supply sheet published by the Red Cross gave a list of the number of these splints on hand on a given date, and the number of splints already disposed of. Occasionally it was necessary to send

camions loaded with splints directly from Paris to a hard-pushed division, but in the main the medical supply depots kept the hospitals and the battalion dressing stations well stocked.

MANUFACTURE OF DRESSINGS AND ACCESSORY SUPPLIES

Dressings and accessory supplies were also manufactured by the Red Cross in large and well-lighted rooms in Paris. The sterilization was all done in France, though many of the dressings were made in

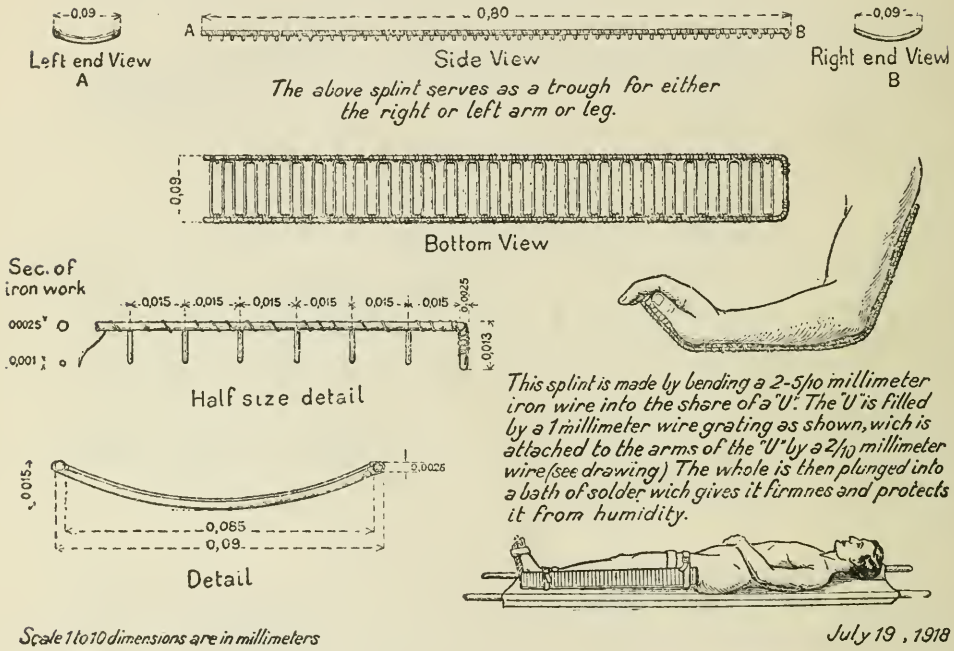

0,09
A
0,80
B
0,09
Left end View
A
Side View
Right end View
B
The above splint serves as a trough for either the right or left arm or leg.
0,09
Bottom View
Sec. of iron work
0,0025
0,001
0,015
0,015
0,015
0,015
0,015
0,015
0,0025
0,0013
Half size detail
This splint is made by bending a 2-5/10 millimeter iron wire into the shape of a "U". The "U" is filled by a 1 millimeter wire grating as shown, which is attached to the arms of the "U" by a 2/10 millimeter wire (see drawing) The whole is then plunged into a bath of solder which gives it firmness and protects it from humidity.
0,015
0,0025
0,085
0,09
Detail
Scale 1 to 10 dimensions are in millimeters
July 19, 1918

FIG. 9.—MECHANICAL DRAWING OF LADDER SPLINT MATERIAL.

Uses.—(*a*) For shoulder, upper arm, elbow, forearm, wrist, hand, lower leg, ankle and foot splints. (*b*) For side splints in combination with Cabot posterior wire leg splint. (*c*) For coaptation splints. (*d*) For various uses where malleable light splint material is to be desired.

America from standardized samples sent over to the United States. They were distributed also to the medical supply depots and thence to the hospitals and dressing stations. Without the generous and efficient help of the Red Cross it is difficult to say how the splints and dressings could have been ready in sufficient quantities at the time they were needed. The debt which the Army owes to the Red Cross is a heavy one in this respect. The quality of the splints was always good, and the accurate manufacture and sterility of the dressings were constant.

TRANSPORT TO AMERICA

For transport to America these same standardized splints have been used and, with the exception of the frequent use of plaster of Paris, they have been the only types used for ocean travel and have proved efficient under these conditions also.

It has been evident to all surgeons at the front, and equally evident to medical officers in the rear and in the home hospitals of America, that the standardization and simplification of the transport splints and the splint drills which were held in all the divisions prior to combat duty, have resulted in the bone and joint cases being received at the evacuation hospitals in remarkably good condition, and to a very large degree have eliminated one of the commonest causes of shock. The splint system has aided very materially in the prevention of deformity. The national burden of the cripple has been lightened.

In the early days of the war, before anything like careful radial control of the bone and joint cases was possible in the English and French armies, and before the splinting was in any sense standardized and carefully supervised by specially trained surgeons, the number of preventable deformities which were returned to the home hospitals was very considerable. In certain home hospitals they were estimated by some of the surgeons to comprise over 30 per cent of these bone and joint injuries. Motion had not been conserved, favorable conditions for ankylosis had not been retained, and, while it was easy to understand the way in which these unhappy conditions occurred, their existence showed that more improvement in the system was possible.

RESULTS AS SEEN IN AMERICAN HOME HOSPITALS

We have outlined the very careful system of drill and supervision which was organized in our Army as a result of this British and French experience, and it was with a very great interest that we began to review our bone and joint cases after they were returned to America. The results have been almost unexpectedly satisfactory. They have seemed to show that meticulous attention to very early and very carefully standardized splinting, the radial control of cases from the point of view of conservation of function and the maintenance of position of joints favorable to function even if ankylosis should occur, have resulted in the very low percentage of preventable deformities our wounded are showing on their return to America.

It has been possible, by means of terminal clearing stations, to halt the cases coming down to the base ports and correct many of the slight deformities which had occurred on the other side. It seems to us a cause for congratulation that it has been possible to escape these preventable deformities representing, as they do in the first place, a heavy and unnecessary burden for the soldier and also for the body politic.

A DEPENDABLE BANDAGE ROLLER

By NORVELLE WALLACE SHARPE, M.D., F.A.C.S
Late Captain, Medical Corps, United States Army

(With one illustration)

Some years ago a hand-driven bandage rolling apparatus was usually part of the equipment of a surgeon's office, likewise was such to be found in the stock of the surgical service of most hospitals. Numerous types, of a more or less complicated construction, were regularly listed in current instrument catalogues.

This period was followed by factory-made bandages, of excellent character, with a corresponding diminution in the general usage of the individual bandage roller.

During, and subsequent to, the period of the war there has been an increased demand for individual bandage rollers, partly by surgeons, partly by numerous Red Cross Chapters, partly by civilian and military hospitals. The notable advance in cost of cotton fabrics has stimulated this means of efficient economizing.

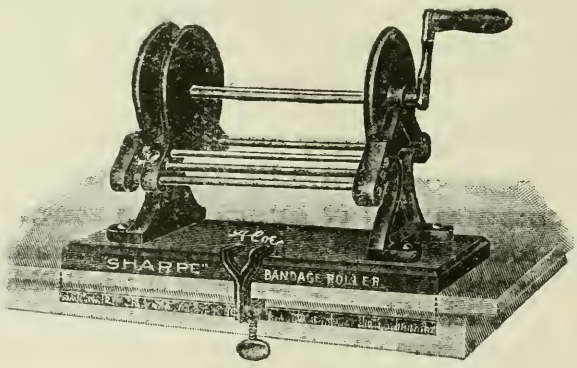


Plate 1

That the majority of bandage rollers, accessible in the shops, are either fragile in construction, needlessly complicated in mechanism, or unduly expensive, is obvious.

A fairly extensive employment of well-known types by the surgical classes in the Medical Department of St. Louis University has exhibited the fact that a bandage roller that would withstand the grueling manipulations of the sophomores had not been found.

Some years ago, I devised a roller that has afforded me yeoman service. It was simple in design, strong, dependably efficient, not

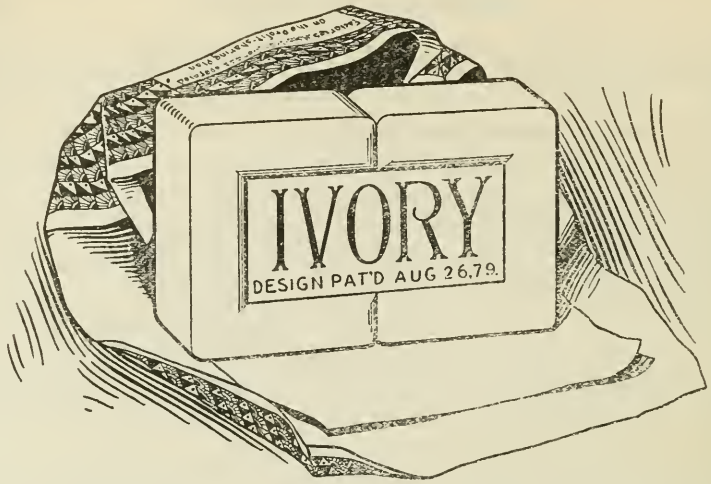
unreasonably expensive. Aloe & Co. has succeeded in reproducing my model.

This roller has proved satisfactory under the severe usage given by large classes of medical students, and in the hands of sundry Red Cross Chapters, that have either purchased it primarily, or have abandoned other models less desirable and usually more expensive.

Plate I exhibits this roller, which will readily develop bandages up to 6 inches in width. Upon a substantial hard maple base (12 inches by 5 inches by ¾ inch) have been erected two upright flanges of gray iron. Upon connecting guide bars (3/16-inch cold rolled steel) plays a movable gauge (4 inches in diameter), controlled by a set screw. A central steel rolling bar, 5/16-inch hexagon, terminates in a stout crank, with handle of wood. Finish: nickel, enamel, and varnish.

If permanence is desired, the base may be screwed to table or bench; if portability is preferred the clamp, which is furnished, should be employed. The manufacturer guarantees material and workmanship.

Loyal efforts to coöperate with the orders of the Surgeon General, in economic disposition of surgical dressings, would have been greatly facilitated had strong bandage rollers of this type been made generally accessible.



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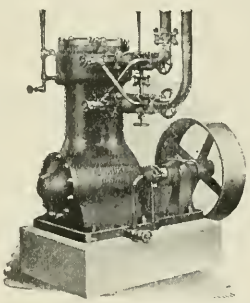

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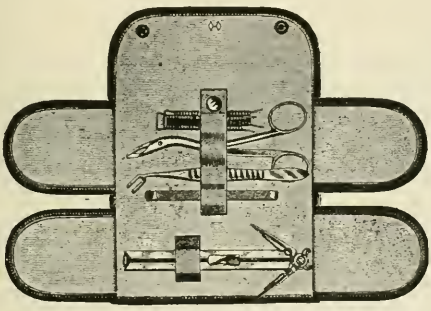

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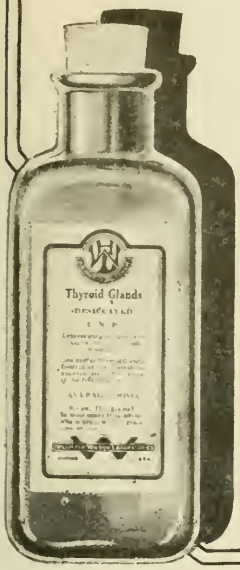

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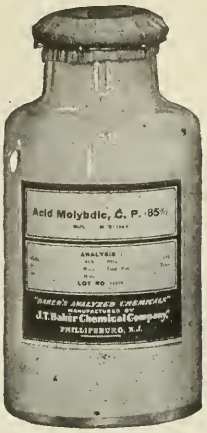

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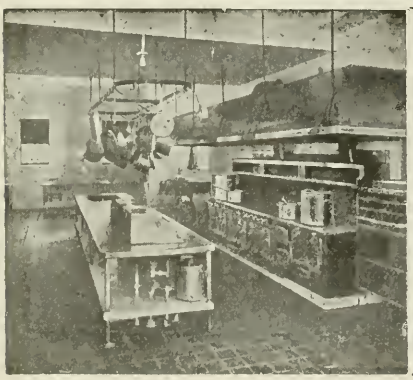

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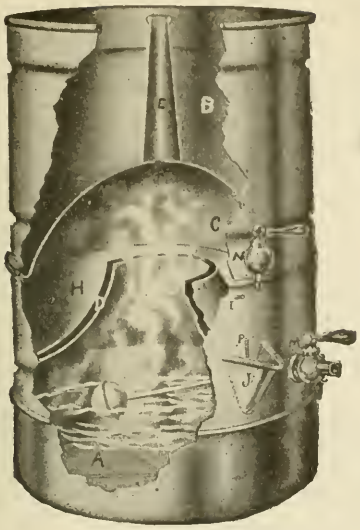

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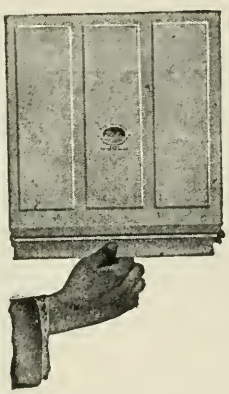

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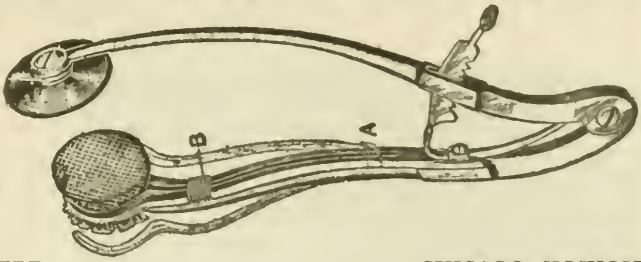

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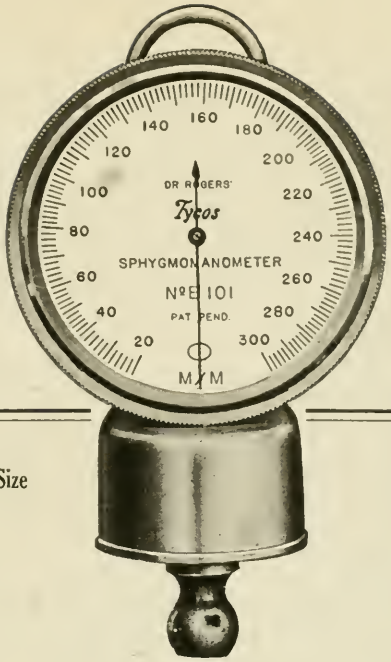

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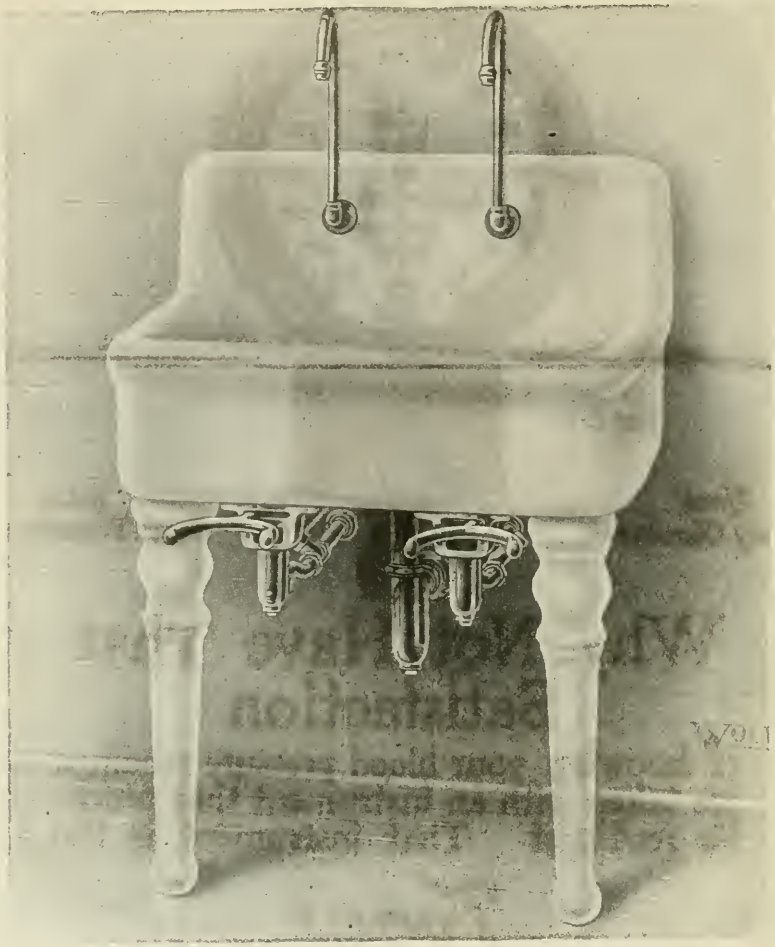

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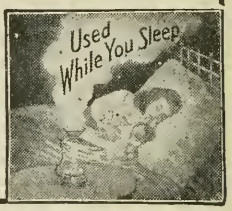

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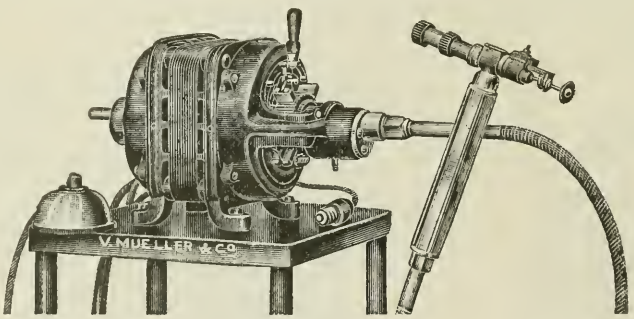

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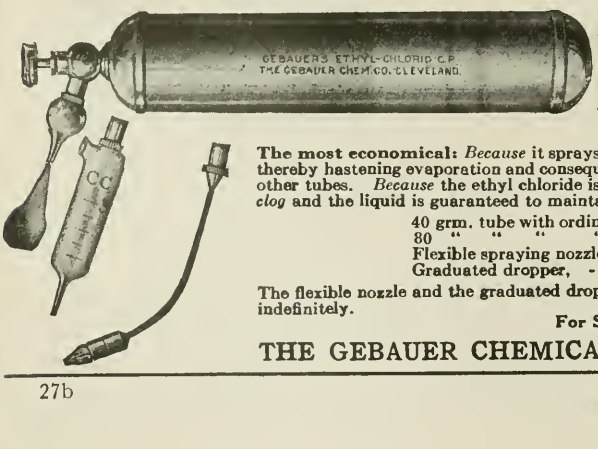

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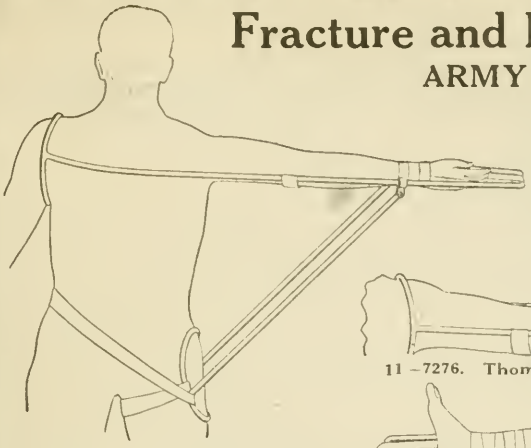

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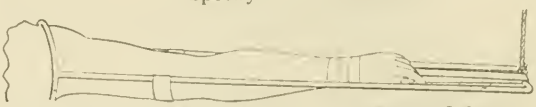

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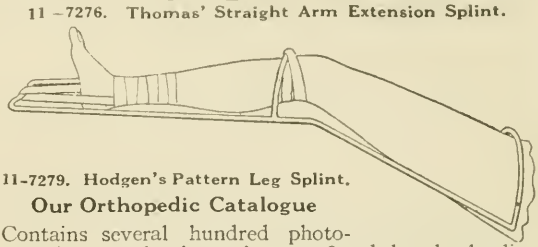

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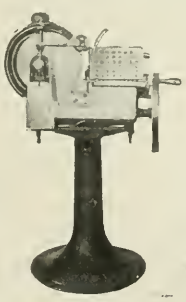

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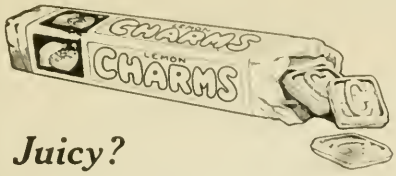

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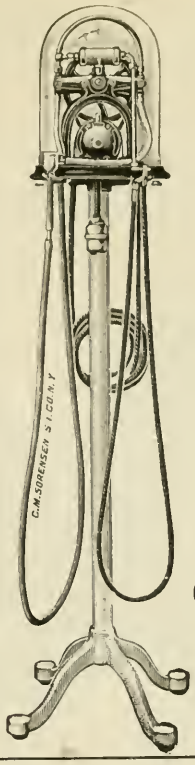

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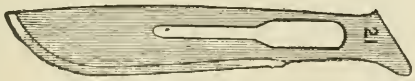

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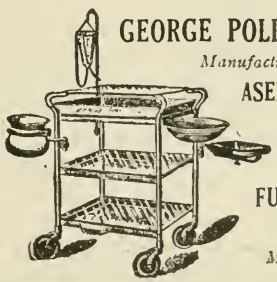

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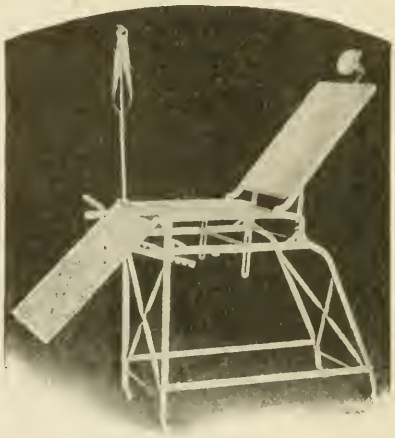

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Index to Advertisers

F = Front section magazine. B = Back section.

	Page
American Laundry Machinery Co.	4b
American Slicing Machine Company	29b
American Sterilizer Co.	27b
A. P. W. Paper Co.	17b
Armour & Co.	8f
Baker Chemical, J. T., Co.	13b
Baker & Co., Inc.	24b
Bard-Parker Co., Inc.	30b
Bauer & Black	7f
Bausch & Lomb Optical Co.	4b
Bernstein Mfg. Co.	21b
Betz, Frank S., Co.	28b
Born Steel Range Co.	15b
Carnes Artificial Limb Co.	33b
Carstens, H., Mfg. Co.	20b
Castle, Wilmont, Co.	28b
Charms Co.	30b
Clinton-Wright Wire Co.	11b
Colson, The, Co.	8b
Columbia Steel & Shafting Co.	24b
Columbus Aseptic Furniture Co.	32b
Corby Co., The	4b
Dermatological Research Laboratories	33b
Diack, A. W., Co.	8b
Dix, Henry A., & Sons Co.	24b
Drackett, P. W., & Sons Co.	26b
Eastman Kodak Co.	37b
Electro Surgical Instrument Co.	32b
Eli Lilly & Co.	29b
Fisher, John C., Mfg. Co.	8b
Fogg, Chas. E., Co.	26b
Ford, J. B., Co.	34b
Gebauer Chemical Co.	27b
Gibson Co., The	10b
Gilman, Z. D.	32b
Gibson Snow Co.	33b
Hardy, F. A.	9b
Haslam, Fred & Co.	10b
Heil, Henry, Chemical Co.	8b
Hoffman & Billings Mfg. Co.	26b
Hollister-Wilson Laboratories	12b
Horlick's Malted Milk	29b
Hospital Nurses Uniform Co.	2b
Kny-Scheerer Corporation	3b
Kumyss, Inc.	33b
Lederle Antitoxin Laboratories	7b
Lippert, Henry H.	8b
Mellin's Food Co.	6b
Melrose Hospital Uniform Co.	34b
Merrell, J. S., Drug Co.	8b
Metz, H. A., Laboratories	2b
Morandi-Proctor Co.	19b
McCambridge & McCambridge Co.	32b
McDermott Surgical Instrument Co.	19b
Mueller, V., & Co.	27b
Mulford, H. K., Co.	2f
National Bank of Washington, The	30b
National Capital Press	20b
Norwich Pharmacal Co., The	12b
Parks-Davis Co.	18b
Perkins-Campbell Co.	10b
Pierce, Harvey R.	7f
Pilling, Geo. P., & Son Co.	6b
Poll, George, Co.	30b
Procter & Gamble Co., The	1b
Radium Chemical Co.	15b
Randall-Faichney Co.	4f
Reed's, Jacob, Sons	16b
Roelker, H. B.	8b
Schering & Glatz, Inc.	21b
Schieffelin Co.	7b
Scholl Mfg. Co.	14b
Scientific Utilities Co., Inc.	2b
Sharp & Dohme	15b
Sharp & Smith	10b
Sherman, C. H.	Cover 2
Simmons Co.	5b
Sklar, J., Mfg. Co.	19b
Southern Aseptic Laboratories	25b
Squibb, E. R., & Sons	20b
Standard Oil Co.	5f
Stearnes Co., The	11b
Stearnes, E. C., & Co.	20b
Surgeons' & Physicians' Supply Co.	7f
Takamine Laboratory, Inc.	34b
Taylor Instrument Company	22b
Thorkildsen-Mather Co.	25b
Trageser, John, Steam Copper Works	16b
Union Broach Co., Inc.	8b
United Limb & Brace Co., The	25b
Van Range, John, Co.	19b
Vapo-Cresolene Co.	27b
Victor Electric Corporation	31b
Vilter Mfg. Co., The	9b
Warner Macaroni Co.	35b
West Disinfecting Co.	35b
Wilbur, H. O., Co.	9b
Wilford Hall Laboratories	Cover 3
Wocher, Max, & Sons Co., The	30b
Wolff, L., Mfg. Co.	23b
Wrought Iron Range Co.	25b

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